

Deliverable 5.1

# Institutions, Policy and Conflict in Highland Aquatic Resource Conservation

## Overview report

*by*

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## INTRODUCTION

The HighARCS project is working in five locations in India, Vietnam and China. Work Packages 3 and 4 have documented the state of the aquatic resource eco-systems at the project sites and the livelihood situation of the communities living there.

Work Package 5 complements the research undertaken in these work packages by documenting, assessing and understanding the role of key actors and stakeholders in regulating and managing highland aquatic resources, as well as providing an overview of relevant policy and legislation in each of the study sites in order to provide a base for suggestions of policy actions. Conflicts between uses and users have been explored, and efforts made to enable conflicts between local, national and international policy and legislation and existing highland aquatic resources management practices to be identified. The methodological approach used has been inspired by the framework given in the IUCN Guidelines “An Integrated Wetland Assessment Toolkit” (Springate-Baginski et al. 2009).

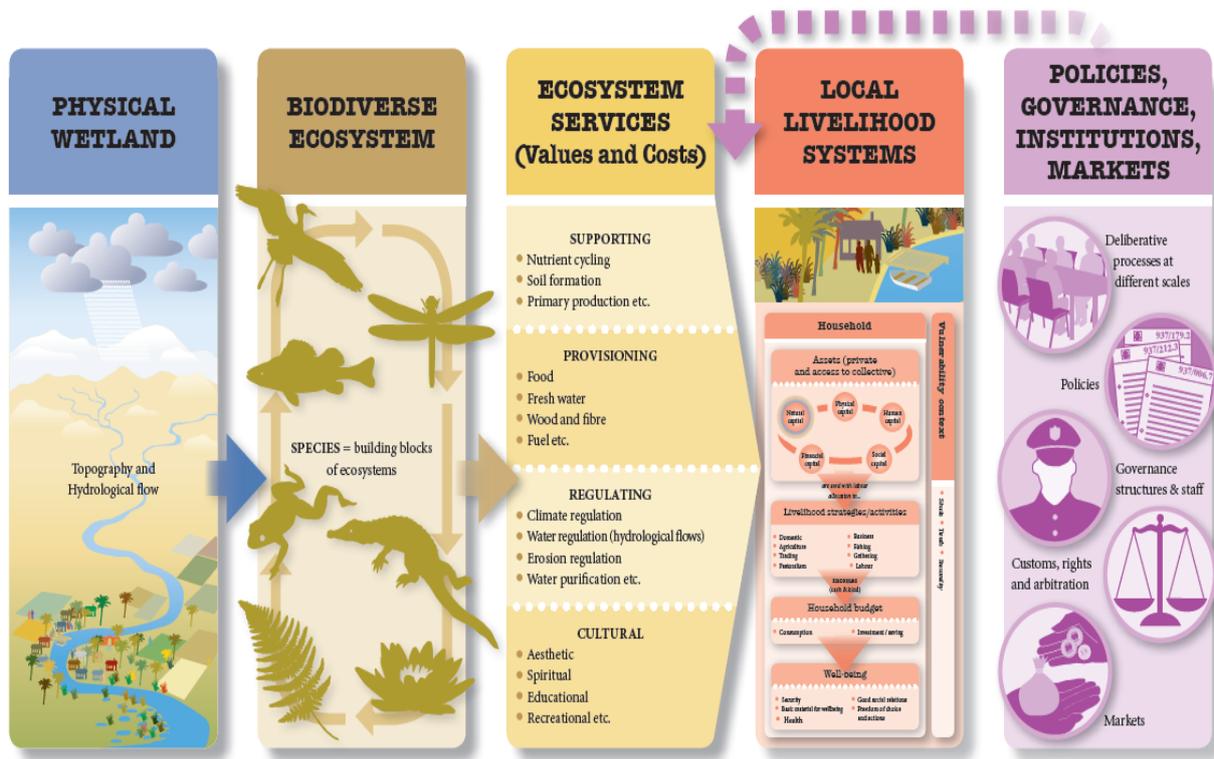


Figure 1: Interlinked aspects of a wetland landscape (Springate-Baginski et al. 2009)

## ***Research questions***

Resource management situations and institutional frameworks differ considerably across the five project sites of HighARCS. However, the following four major research questions have been pursued by all four teams:

- a) What are the structure and salient modes of operation of the national political and administrative systems, and how do they influence the way in which decisions about development and environmental policies and resource management rules are made and being implemented?
- b) In each selected field site, what are the existing institutions and legislations, which mediate access to aquatic resources at multiple scales and levels of government? How are these laws and policies enforced and implemented, and how are decision-making processes taking place at this level?
- c) What are stakeholder interests, dilemmas and conflicts of sustainable management of aquatic resources in the study sites? How do conflicts evolve and relate to the enforcement of existing policies and legislations by the relevant institutions and through the existing decision-making processes?
- d) What policies and institutional actions are needed to improve aquatic resource management practices and resolve identified conflicts between multiple stakeholders, in order to ensure sustainable resource management whilst maximising local income generating activities? Who should be responsible for these actions?

## ***Methodology and sources of data***

Each in-country report has been structured according to a common framework used at all five study sites of the HighARCS project (Lund 2010). The framework has subsequently been adapted by each of the teams individually according to the available time resources, size and expertise of the respective research teams.

In order to investigate the above questions, secondary data inventorying existing legislation, policies and programmes have been collected. Likewise, the political decision-making systems and administrative systems of implementation have been identified. Data for more specific analyses of institutional aspects of the local aquatic resource management and livelihood issues at our project locations have been collected in several ways. Some information was gathered through questions

integrated and collected through the household interviews and focus group discussions undertaken by WP 3 and WP4.

A major effort has been made in collecting the texts of the relevant existing laws, but much of the information gathered on existing government policies and programs has been collected as secondary materials from available internet sites or official reports obtained from various government offices. At the local level, expert interviews and consultation with resource persons from government institutions or local organizations has been a frequently used form of data collection strategy. Moreover, focus group discussions were held with community members in connection with the overall data collection activities for the Work Packages Three and Four of the HighARCS project. Other information has been procured through the application of stakeholder Delphi exercises with selected government officers, households and other local stakeholders. The actual account of the outcome of the stakeholder Delphi exercises however will be reported in Deliverable 5.2, except for the case of the in-country report of the Chinese site.

## ***Overview of the in-country reports***

### **National political and administrative systems**

The five HighARCS project sites are located in countries with quite different political and administrative systems. The project sites in China and Vietnam are located in political systems, respectively designated as *People's Democratic Republic (China)* or *Socialist Democratic Republic (Vietnam)*. They are characterised as *single party states* and organised according to *democratic centralism*. The two Indian sites are located in a *Federal Constitutional Republic* organised according to a multi-party parliamentary system of *representative democracy*.

India is organised as a federation of states and union territories. China is organised in provinces, autonomous regions, four self-governing city municipalities, and two special administrative regions (Hong Kong and Macao). Vietnam is organised as one state, with a number of provinces. India, national legislation may be amended at the State level.

The role of civil society – non-governmental organisations, trade unions, grass root movements, self-organised community groups, etc. – differs across sites. India has a strong tradition of active NGO's and popular movements to the extent that it could be said that they have become indispensable actors of governance in India, both as complementary service providers in support of governmental programmes and policies, and as interest groups influencing the political agenda. In Vietnam and China, local organisations tend to be organised within the existing hierarchical one-

party system. In both Vietnam and China, however, a few NGOs or NGO-like organisations have begun to appear. Therefore, widespread paradigmatic view claiming the importance of applying participatory approaches as a necessary condition to achieve wise-use and sustainable management of aquatic resources also inscribed in the HighARCS Project Document will be given different operational interpretations across sites.

### **Common issues and challenges across sites**

In spite of the huge differences in local context, the legislative frameworks relevant to the management and state of highland aquatic resources are characterised by a high degree of complexity and multiple institutional actors referring to different laws and regulations. This implies a strong need for coordination and mediation between institutional partners.

Other common issues are found to be a lack of specific local regulatory rules and enforcement capacity, the lack of knowledge or consciousness about the environmental protection laws that exist, and the dilemmas of prioritizing between policies of economic growth, energy provision and the protection / conservation of biodiversity and eco-system services.

### **Institutions & legislations mediating access to aquatic resources**

Each of the in-country reports has identified existing environmental laws, including laws on biodiversity. Additionally, water management laws, laws on urban planning, infrastructure etc, and social laws (rights, entitlements to resources and livelihood assistance) are presented. The various government institutions or organisations having the authority and mandate to implement the respective laws have been mapped, and there specific policies and on-going programmes and projects inventoried.

All three countries have a mixture of a certain degree of market economy and a state-controlled planning system mediating the access to aquatic resources. Fish-markets have been surveyed, sand- and grabbles or other mining activities have been observed. Most other ecosystem services of aquatic resources in the study sites are not accessed through market structures, but rather through regulation or free-access regimes. Most important is the construction of dams and hydropower stations, which are dependent on overall government energy policies.

### **Stakeholder interests, dilemmas and conflicts**

Stakeholder composition and interest and dependency on aquatic resources vary across the sites. In China, we have focussed on a small group of marginalised artisanal fishermen dependent on an ever

diminishing stock of natural fishes in the river. The fish stock is diminishing mainly due to the construction of water dams, as well as activities of sand-mining in the riverbed and pollution from industrial waste water. Fishers do not wish to continue their livelihoods as fishers and are counting on income transfers from their children receiving an education and finding employed work elsewhere, or on resettlement schemes and pensions from the State. In the two Vietnamese sites, the construction of water dams also constitute the main factor influencing the state of the aquatic resources, but as it can be read in the in-country report, the situation is much more complex than this one issue. The Buxa site in West Bengal, India, is a location within a Tiger Reserve under the jurisdiction of the Forest Services. This has quite special implications for the opportunities for engaging local populations within the reserve in action plans for aquatic resource conservation and improved livelihoods. Finally, the Nainital Lakes District site in Uttarakhand, India, is an example of a situation with a rapid urbanisation around the lake shores mainly driven by tourism, and the need for the coordination between the authorities with regards to environmental protection, urban planning, urban waste handling, and pollution of the waters of the lakes.

### **Policies and institutional actions needed to improve aquatic resource management**

On the basis of the identified institutional and legal context and situation, site specific suggestions for actions which could be made to better preserve the aquatic resources and improve local livelihoods within existing policies and programmes (wise-use options<sup>1</sup>) have been made for each site. In some cases, suggestions also point towards the need for the elaboration of local rules of management of the aquatic resources, institutional capacity building and the establishment of

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<sup>1</sup> The concept of *wise-use* originally refers to a stance in the environmental policy debates which opposes environmental movement as being a (too) radicalist movement. According to Wikipedia ([http://en.wikipedia.org/wiki/Wise\\_use#Background\\_to\\_the\\_.22movement.22](http://en.wikipedia.org/wiki/Wise_use#Background_to_the_.22movement.22)), the wise use movement argues that (local) rural residents suffer a disproportionate impact from environmental regulations, and that the environmental movement is biased toward the attitudes of urban elites, ignoring the rural perspective. Members supporting the wise use movement are to be found amongst anti-environmental groups, companies in the resource extraction industries, land development companies and by libertarian and minarchist organisations. In consequence, opponents to wise – use observe that the extractive forces behind the wise use movement harm rural residents more and prey on the independence of rural residents - preaching the "right to ride" when behind that is the desire to strip mine and clearcut using unsustainable methods.

Most members of the research teams in the HighARCS project certainly seem to agree that the issue of conservation of biodiversity should not be a concern of the urban elites at the expense of marginalized rural communities, and that the rights to sustainable livelihoods for local people should be given full attention in its own right. However, this should not be taken as an unconditional support to libertarian policies and a blind claim for the retreat of the State and environmental regulatory measures. Thus, the HighARCS interpretation of the concept may lie closer to that proposed by the Ramsar Convention : "Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development" ([http://www.ramsar.org/cda/en/ramsar-about-faqs-what-is-wise-use/main/ramsar/1-36-37%5E7724\\_4000\\_0\\_](http://www.ramsar.org/cda/en/ramsar-about-faqs-what-is-wise-use/main/ramsar/1-36-37%5E7724_4000_0_))

institutional arrangements and communication systems to secure effective coordination between the implicated local authorities and the communities.

### ***In-country reports***

The preliminary country reports are included as appendices.

1. Institutions, Policies and conflicts Related to Sustainable use and Protection of Aquatic Resources in Beijiang River Watershed, China
2. Report on Institutions, Policies and Conflict in Highland Aquatic Conservation in the Northern and Central Vietnam
3. Institutional, Policy and Conflicts Report, Uttarakhand Site, India
4. Institutions, Policy and Conflict – Final Report from Buxa West Bengal

### **References**

Lund, S. (2010). *Work Package 5 – Report on institutions, policy and conflict: A Draft framework for country reports*. HighARCS working note.

Springate-Baginski, O. et al. (2009). *An Integrated Wetland Assessment Toolkit. A guide to good practice*. Cambridge: IUCN Species Programme.

## **Section 1**

**Institutions, policies, and conflicts related to sustainable use  
and protection of aquatic resources in Beijang River Watershed, China.**

**Institutions, Policies and Conflicts  
Related to  
Sustainable Use and Protection of Aquatic Resources  
in Beijiang River Watershed, China**



by Jiang Baoguo, Wang Quandian, Gao Min, Luo Shiming

**South China Agricultural University, China  
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## **Institutions, Policies and Conflicts related to Sustainable Use and Protection of Aquatic Resources in Beijiang River Watershed, China**

by Jiang Baoguo, Wang Quandian, Gao Min, Luo Shiming  
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### **Abstract**

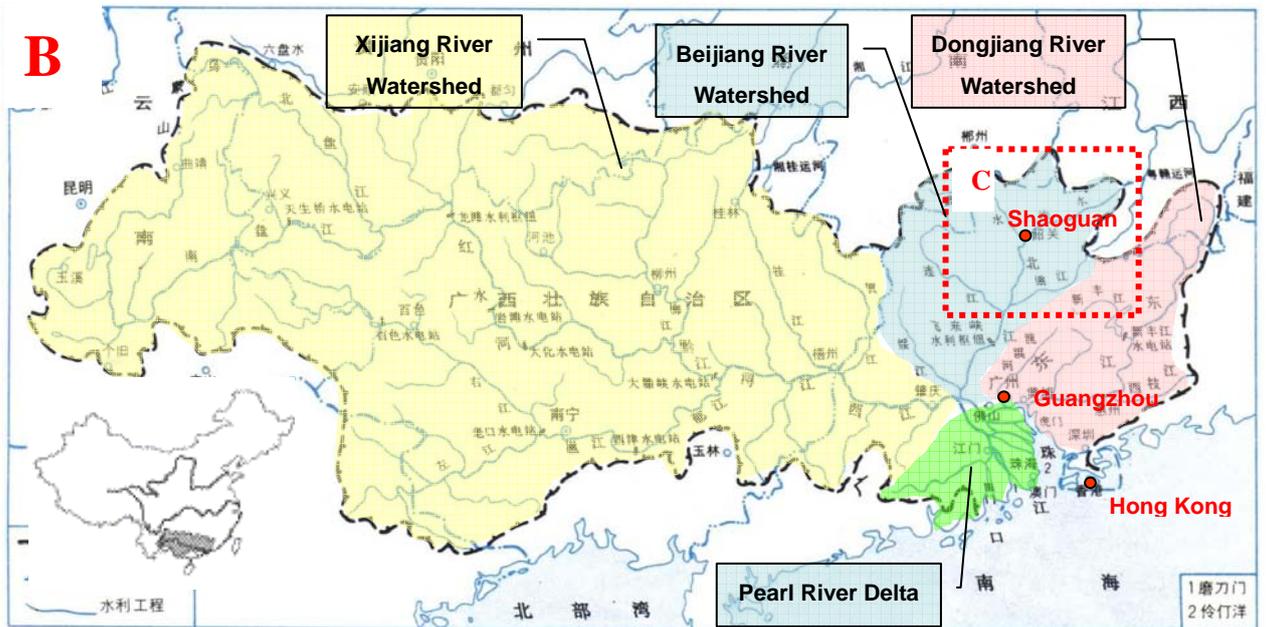
After a brief review of the legislation and policy framework related to the sustainable use and protection of aquatic resources in Beijiang River Watershed, the conflicts and weakness of the management system is analyzed. The workable detail policy for the law implementation and the enforcement efforts are two major issues. After an introduction of great efforts which have been carried out by local government to improve the conservation of aquatic resources and the livelihood of fishers, some of the remaining problems are also pointed out. The coordination of efforts from different section of the management system should be strengthened. Several participatory methods were used in the research. The result from the state of system (SOS) workshop indicated that our understandings of the situation in Beijiang River Watershed were supported by most of the stakeholders. A three round Delphi method showed that Fishers are more eager to have policy change than other groups of stakeholders. In general, stakeholders agree that the most important measures for preservation of resources are industrial pollution control, sand mining control, and the most important measures to improve the livelihood of fishers include improvement of medical care system, subsidy for the poorest, oil subsidy for motor in fishing boat, improve housing situation, and receive compensation from hydropower station. A Driver-Pressure-State-Impact-Response (DPSIR) method for situation analysis is also used. This analysis will be useful for future action plan.

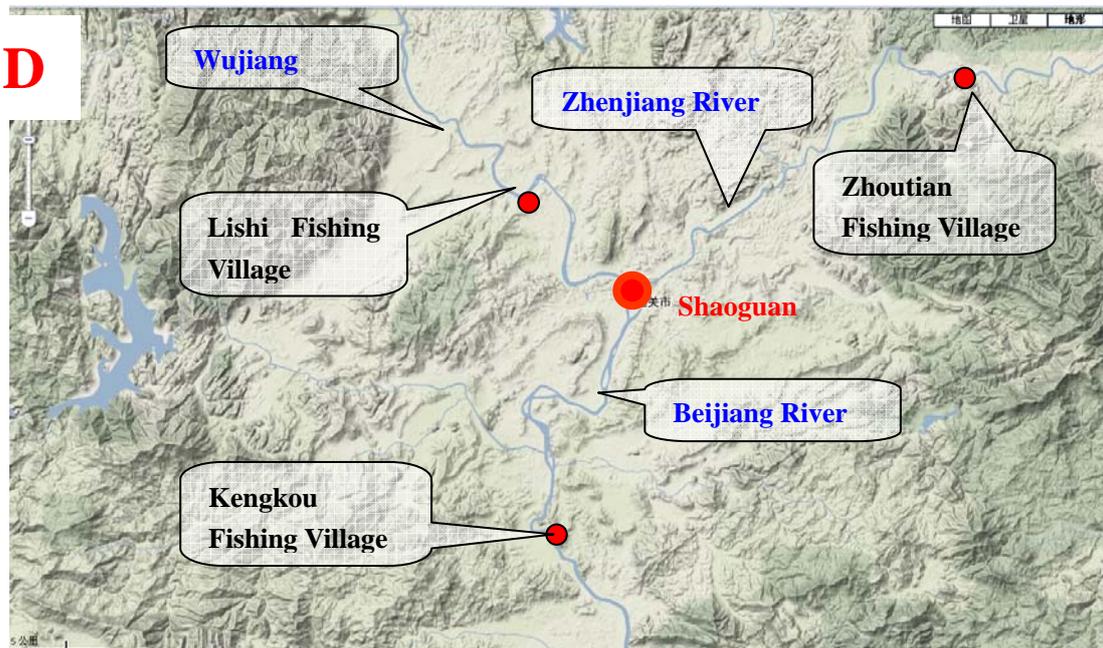
Under the project “Highland aquatic resources conservation and sustainable development (HighARCS)” under the 7<sup>th</sup> framework programme, Theme6 (environment) supported by European commission, we have analyzed the general situation of Beijiang River, the upper reach of the Pearl River, South China in our 2009 situation report. In the second stage of the project, we conducted an in depth analysis on the biodiversity and ecological services (WP3), livelihood of the fishermen (WP4), and the management situation (WP5). Based on this analysis, some action plan will be proposed. This report of WP5 focuses on institutions and policies related to the protection and utilization of fishery resources, biodiversity, the livelihood of fishermen, review of legislative system of related laws, incoherence between national law and international treaties, etc., and using methodologies like Delphi and DPSIR to analysis the conflicts among stakeholders and the possible strategy in future actions .

## **1. Introduction**

The project sites are in Shaoguan city which is located on upper reaches of the Beijiang River (Fig. 1) . There were plentiful aquatic resources in the past. However, tremendous decline in aquatic resources happened because of the industrial and economic development in the region. (See section 2.1.5, WP3 Report from China). No in-depth and comprehensive study has been conducted to understand these constraints and explore possible ways of addressing them. Based on the above mentioned problem, the research of HighARCS in China site aims at the specific objectives as follows:

- A. to investigate and evaluate biodiversity of aquatic resource and ecological service of ecosystem in Beijiang river;
- B. to analyze the main factors that contribute to the decreasing aquatic resource;
- C. to identify different groups of fishermen to explore better some new development efforts;
- D. to identify stakeholders, their roles and linkages in relation to highland aquatic resource in Beijiang river;
- E. to identify the possible livelihood development strategies of households dependent on aquatic resource;
- F. to formulate and implement action plans to enhance poor livelihood of the poor and to improve aquatic resource conservation.





**Fig. 1 The Location of Beijiang River Watershed in Pearl River Watershed**

Map A shows the location of Pearl River Watershed in China

Map B shows the location of Beijiang River Watershed in the Pearl River Watershed

Map C shows the location of Shaoguan Municipal Area

Map D shows the locations of the sample villages of this research project

Sources:

Google Map and <http://www.chinabaike.com/article/sort0525/sort0543/2007/20070801157011.html>,

<http://www.ipe.org.cn/index.jsp?qybh=1911>

## **2. National governance systems**

The People's Republic of China (PRC) is a unitary multi-national state created jointly by the people of all its nationalities. Social relations of equality, unity and mutual assistance have been established among the nationalities and will continue to be strengthened. China will be in the primary stage of socialism for a long time to come. The basic task of the nation is to concentrate its effort on socialist modernization along the socialist road with Chinese characteristics, adhere to the people's democratic dictatorship and the socialist road, and persevere in reform and opening to the outside world.

According to the Constitution of the PRC (amended in 2004), State structure of People's Republic of China is composed of the National People's Congress (NPC), National People's Political Consultative Conference (NPPCC), Presidency, State Council, Central Military Commission, Supreme People's Court, Supreme People's Procuratorate. The National People's Congress is the highest organ of state power. NPPCC is the political consultation body and a working mechanism for various political parties in China. PCC has the power to monitor the government operation and to give their political advice to government. The Standing Committee of the NPC is the permanent organ of the NPC. The state administrative organs, judicial and prosecuting organs are all elected and supervised by and report to the people's congresses which are organs of state power. These state organs conduct their activities according to the principle of democratic centralism. The State presidency is an independent State apparatus and a component part of China's State organization. China implements a system of collective leadership. The president is subordinate to the NPC.

The central administrative organ is the State Council. The State Council namely the Central People's Government, is the highest executive organ of State power, as well as the highest organ of State administration. Ministries and Commissions under the State Council include Ministry of Foreign Affairs, Ministry of National Defense, National Development and Reform Commission, Ministry of Education, Ministry of Science and Technology, Ministry of Industry and Information Technology, State Ethnic Affairs Commission, Ministry of Public Security, Ministry of State Security, Ministry of Supervision, Ministry of Civil Affairs, Ministry of Justice, Ministry of Finance, Ministry of Human Resources and Social Security, Ministry of Land and Resources, Ministry of Environmental Protection, Ministry of Housing and Urban-Rural Development, Ministry of Transport, Ministry of Railways, Ministry of Water Resources, Ministry of Agriculture, Ministry of Commerce, Ministry of Culture, Ministry of Health, National Population and Family Planning Commission, People's Bank of China, National Audit Office.

The vertical administration structure in China includes the national level, provincial level, city level, county level, township level and village level. The structure of government, people's congress and people's political consultation conference are quite similar in different administration levels except smaller and simpler in the lower level. Laws can only be approved by the National People's Congress. Other management bodies such as the state council, provincial governments

and provincial people's congress, and the governments and provincial congresses of some big cities have the right to make some more detail regulation and policy related to national laws or even some new laws. However, the regulation or policy they make, can not violate those passed by the National People's Congress.

The Communist Party of China (CPC) is the party in power in the country. There are eight other democratic parties in China. Multi-party cooperation and political consultation under the leadership of the CPC is the basic political system in China. The eight Chinese democratic parties are the Revolutionary Committee of the Chinese Kuomintang, the China Democratic League, the China Democratic National Construction Association, the China Association for Promoting Democracy, the Chinese Peasants and Workers Democratic Party, the China Zhi Gong Party (Public Interests Party), the Jiu San (September 3rd) Society, and the Taiwan Democratic Self-Government League. These democratic parties join the decision-making process via channels such as the People's Political Consultative Conferences in different organization levels. Some of their party members also work in different key positions in the government. They are decision makers already, and their voices can be heard much easier by decision-makers in a higher level.

Here we introduce about the social structure of Beijiang River watershed, specifically Shaoguan City which covers the major area of Beijiang River watershed, and introduce about the legislation framework related to biodiversity and livelihood in the region.

### **2.1 The political and administrative organisation of the study area**

Shaoguan as a municipal management region covers 3 districts, 5 counties, 1 autonomous county and 2 cities with the municipal government located in the District of Zhengjiang County. The 3 districts are further divided into 10-20 towns or sub-districts. Governments in municipal and county levels set up departments such as agricultural bureau (fishing agency included), environmental bureau, water conservancy bureau (water administration agency included), civil administration bureau, labor and social security bureau, forestry bureau, police bureau, education bureau and transportation bureau etc. Each town consists of several villages, groups or communities, with their own village committees or residential committees for the management of their common affairs. Farmers' collective (cooperative) economic organizations are in forms of economic cooperative societies, agricultural products associations, and professional cooperative associations. These community organizations are responsible for carrying out the policies from governments and for handling social and economic affairs among farmers. Fishing villages are classified as collective producing organizations, and are under the nominal administration of adjacent villagers' committee or residents' committee. Fishermen are generally regarded as city residents in China's management framework.



**Fig. 2 A fishermen in Beiji River after fishing at night**

## **2.2 Policies on environmental protection, poverty alleviation and sustainable livelihoods**

### **2.2.1 Comprehensive legal measures for environment protection**

According to Environmental Protection Act (1989), Environmental Impact Assessment Act (2002), Fisheries Act (revised in 2004), Prevention and Control of Water Pollution Act (revised in 2008), Governments are responsible for framing environment protection programs and establishing and managing nature reserves. Environment impact assessment is essential to all construction projects and governmental programs. Industrial projects and their environment protecting facilities are required to be designed, constructed and run simultaneously. Users of natural resources should pay special tax for the usage of natural resources and they should apply for special licenses. Action plan for emergency situation caused by pollution is required to be formulated. Alien species should be examined, quarantined and monitored for risk assessment. Alien invasive species should be recorded and effort should be pay for its elimination. Any infringement of related laws should be punished.

### **2.2.2 Legal rules protecting key environmental elements**

**Legal rules protecting key wild animals:** According to Wildlife Protection Act (revised in 2004) , key wild animals are put in a national protection list, and nature reserves are established to protect them. The agriculture departments and forestry departments both are responsible for the protection of wildlife, while the jurisdiction of the former is confined to aquatic wildlife, and the latter is on the terrestrial animals. Hunting or fishing of wild animals is strictly under supervision,

and all transactions of them should also be under supervision. Record of wild biotic resources should be kept for a long-term for monitoring. Users of wild biotic resources should pay extra tax for the sake of protection. Any wounded, grounded or stranded wild animals should be rescued, and those captured by accident should be freed. Anyone who is harmed by wild animals or any lost caused by the protection of them should be compensated.

**Legal rules protecting water resources:** According to Water Act (revised in 2002), governments are responsible for making Water supply and demand plans. Activity of mass harvesting ground water or surface water should be permitted only by getting governmental license. Different functional zones of water resources are to be set up. Resources for drinking water both from underground and surface will be protected. Pollutant discharging by enterprises and individuals alike should be strictly restricted in terms of quality, concentration and total discharge.

**Legal rules protecting forestry: According to Forest Law (revised in 1998),** forests should be classified for different protection measures. Records of forestry resources should be kept. Forestry development and management plan should be made. A forestry development fund should be set up. Land reclamation, rock quarrying, sand quarrying, soil extracting and other activities with the result of deforestation should be forbidden.

**Legal rules protecting farmland resources:** According to Land Administration Act (revised in 2004), overall plans should be developed for farmland resources, in which basic farmland preservation areas should be marked. The transition of farmland into construction land should be strictly supervised. Related governmental agencies should conduct surveys on farmland resources and build a national farmland database. Anyone who damages farmland is liable for reclamation, and anyone who occupies farmland should be pay farmland occupation tax.

### **2.2.3 Legal rules protecting women, children and senior citizens**

According to Women's Rights and Interests Protection Act (revised in 2005), Minors Protection Act (revised in 2006), Elderly Rights and Interests Protection Act (1996), women enjoy equal rights with men in politics, culture and education, labor, property and family matters. Maltreatment of women is totally forbidden. The right to receive compulsory education for children of the appropriate age is protected by the law. Parents are liable to raise and care for their children, and maltreatment of children is totally forbidden. Grownup children are liable to care for their parents. Senior citizens are entitled to help from the state and society. Respect and care to senior citizens should be encouraged. Endowment insurance and medical insurance system should be set up for senior citizens. Mistreatment of senior citizens is totally forbidden.

### **2.2.4 Social security policies in rural areas**

The systems for rural basic life security, new rural medical care cooperation and rural medical relief are due to be established. Those rural residents without any family member or relatives are entitled to “five guarantees” (guarantees to food, clothing, residence, medical care and burial). Allowances for the relief from natural calamities should be set up.

### **2.2.5 Social security policies for fishing folks**

Fishing folks are registered as urban citizens, but they don't have any pension or basic life security. Medical insurance is not compulsory for them, which means they have to pay 120 Yuan annually to buy it, and most of them think it is still too expensive. Those fishing families with fishing permits are entitled to get oil subsidy.

In general the legislation related to natural resources and livelihood of the vulnerable groups are getting more and more attention in China and the legislation system is improving. However, more practical policies and the monitoring process should be strengthened. For example, current oil subsidy policies for the fishermen are only temporary to offset the sharp rise in oil price. No one knows for sure how long will it be in effect, but in our study site the oil subsidy has become an important income source for many families.

## **3. Issues & conflict of biodiversity conservation of aquatic resources in the study site area**

Here we analyze the resources situation and livelihood situation of the poor in the region where the conflicts in the society can be found.

### **3.1 Brief overview of the situation of aquatic resources in the study site area**

According to fish investigations in the 1990s, (see section 2.1.1 in WP1 Report from China) there were 144 species in Beijiang River. The major families belong to *Cypriniformes* Order. In history, the fish resource in north river was very rich. The fishing activity there could produce 8,000 tons annually in 1950's. The species captured included eel, grass carp, black Chinese roach, mud carp, triangular bream, eastern barbell, *Spinibarbus hollandi*, spotted long barbell, catfish, and some local rare species, such as *Sinilabeo decorus*, *Sinilabeo discognathoides*, *Ptychidio jordani*, and *Tor (Folifer) brevifilis*. But now the fish resources have been surprisingly decreasing, the annual fishing production was no more than 2,000 t since 2000 (see section 2.1.1 in WP1 Report from China). Most of the fish species the fishermen usually captured in recent 5 years were of the lower valued species such as *Saurogobio dabryi* Bleaker and *Hmculter leucisxulus*. The traditional economic species are decreasing. The total aquatic production was continuously increasing since 1970. Most of this increase was from fresh water fish culture. The percentage from river fishing was continuously decreased. The conservation species such as Asian giant soft-shell turtle, marbled eel, hilsa herring, wattle-necked soft-shell turtle, *Luciobrama macrocephalus* (Lacépède, 1803) were very rare in north river today. Moreover, as a result of the impediment of the power plant, the slowdown of water flow, the pollutant deposition, and the biological accumulation of toxic material through food chain, the quality of wild fish has also gone down. Fishermen complained that the fish captured in this river some time has diesel oil taste, so the price is low. It means that the petroleum pollutant is already quite serious in the river. The major pollution resources came from sand mining boats and pollution discharging factories according to the fishermen. (see section 2.2.1.2 in WP1 Report from China)



**Fig.3 Fish caught by fishermen and sold in the morning market in Shaoguan City**

There are very few surveys on mollusc resources in Beijiang River in recent years. In this investigation, the number of mollusc species and population of mollusc have been found reducing gradually according to local residents. The main reasons are as follows: (1) The growth, reproduction and habitat environment of mollusc were destroyed by dams building and dredging etc; (2) Habitat of mollusc is getting worse because of the pollution with pyrite, tin and oil; (3) Lots of mollusc were buried by flood in 2006 which brought a large number of sand and was almost devastating; (4) The numbers and species of local mollusc were greatly reduced by the invasion of Apple Snail (*Ampullarius gigas* Spix); (5) Fishing effort increased while lack of effort for breeding. Fishermen mainly live on fish fishing and some of them collect mollusc occasionally when they are not busy. They use triangular nets to capture fish.

A field survey of freshwater plants was done in Shaoguan in October 2009. Ten freshwater species were recorded in the less disturbed river bank sections. The largest population was an invasive species Water Hyacinth (*Eichhornia crassipes*), which was found not only in rivers, but also in ponds near villages and agricultural areas. Water cabbage (*Pistia stratiotes*) and Duckweed (*Lemna minor*) are also common in ponds elsewhere. Some native submerged plants such as *Vallisneria natans* and *Hydrilla verticillata* were only found in the site with less disturbed, but seldom seen in the streams or rivers with serious physical disturbances and water pollution in the Pearl River.

Generally speaking, both the varieties and the quantity of aquatic resources are decreasing, which means the biodiversity of the study site is damaged and needed to be restored. Although many aquatic wildlife are not on the protection lists, their sharp decrease will also lead to the loss of balance within the local aquatic ecosystem and finally will affect the livelihood of the natives.

(For more information please refer to WP3 Report of China)

### **3.2 Sustainable livelihoods and poverty alleviation in the study site area**

#### **3.2.1 Livelihoods and market networks**

Aquatic resources in North River play a key role to fishermen's livelihoods in Shaoguan city. Most of the fishermen depend on the aquatic resources to maintain their livelihoods especially the old fishermen. Some fishermen over 70 or 80 years old are still working on fishing because they got very preliminary education and do not have elderly insurance. The fishermen consider that the amount and species of present aquatic resources have declined when it is compared with those ten years ago. The decline of the resources has significant impact on their livelihoods. Almost all of the fishermen don't like their children depend on fishing for their livelihoods in the future any more. Generally the children of fishermen go to town or city to find a job after they finish their junior secondary school. Nowadays, most of the fishermen are over 40 years old, who depend on fishing and don't go to town or city for job. It is because they got very low education and worry that they can't find a job in the city. Those working in the city also worry that they may will go back to continue fishing sooner or later. Therefore, according to the statistics, (please refer to Section 4.1 of WP1 Report from China) the number of fishermen in Shaoguan City has been declining since 20 years ago. Few fishermen consider that their livelihoods are better-off now than 5 or 10 years ago, only because some members in their family have job in the city and have more stable income. The majority of the fishermen considered that there were not too many changes to their present livelihoods and their wealth also did not change too much over last the last 20 years.

#### **3.2.2 Household assets and wealth**

The assets of the households include human assets, social assets, natural assets, physical assets and financial assets. Based on our site surveys, the livelihood assets of fishermen are very limited, which restrict the diversification of their livelihoods. (Please refer to sections 4.1.1, 4.1.2, 5.1.6 of WP1 Report from China)

##### **3.2.2.1 Human Assets**

Generally, the education of fishermen is only to junior secondary school or primary school and there were no education for the old fishermen. The health of most of the fishermen is good but a few of them are not good enough for catching fish and especially those elderly. All fishing knowledge was gained from their own practice or was transferred from their older generations.

There are 704 health institutions in Shaoguan city among them there are 62 hospitals. 97.87% villages and towns have hospitals or health centre and 85.69% villages have health centre. The new cooperative health care plan covers about 63% of the villages. There are health centers near some of the fishing communities and it is convenient for health care but not for the other fishing communities. (Please refer to section 5.1.6 of WP1 Report from China) The fishermen can join the medical insurance like residents in the city and town. However, only those better-off households can afford this. For poor households, they have to pay all for the medical treatment if they get sick. Hence, the economic situation of their livelihoods may become worse.

### **3.2.2.2 Social Assets**

There are no formal or informal organizations such as Fishermen's Association or Fishermen's Cooperatives for fishermen to participate in Shaoguan City. And there are also no organizations at the basic level in the fishing communities. Fishermen are all fishing and marketing the fish independently at the household level. Some restaurant or traders sometimes may go to the fishing-boat to buy the fish directly, but there are no fixed cooperative relations between them. The fishermen who own the license of fishing are all participate in the Farmers Credit Cooperative where they receive subsidize of diesel oil from the government. The fishers always seek help or borrow money from their relatives when they have difficulties. Sometimes the neighbours may organize together to resolve the problems such as that they may raise funds to build the wall along the river bank or the road in the community. Sometimes they may seek help from the local Resident Committee or the Department of Fish of the local government. The household with handicapped member can get allowance from the government. Traditionally men have the final say on economic matters, but in most of the households we visited the couples usually make important decisions together. With more and more young men getting a job in urban factories, they are not dependant on their parents economically—many even can give support to their parents in times of hardship. In general the fishermen are not well organized and their social assets are mainly limited to kinship and then to the neighbours relationship.

### **3.2.2.3 Natural Assets**

A few of the fishermen have their own houses, some of the fishermen live in the houses provided by the government 30 to 40 years ago and the land is belong to the fishing communities. Most of the fishermen rent a house from the local government or live in the boat. About one third of the fishermen has licenses for fishing and can fish in the Pearl River. Another two third of the fishermen do not have the license but they also fish in the river. Although it is illegally by law, this fishing activity is practically allowed by the authority. Since diesel subsidy is only for those with fishing licenses, many of them cannot get the price subsidy for diesel oil from the government. Some of the fishermen collect firewood from the river or the nearby mountains for cooking. Generally the firewood are branches or bushes and do not need a license for cutting. All the fishermen do not have land for farming and most of the daily regular consumptions of vegetables and rice are bought from the market except small amount of vegetables grown in small plots close to the house.

### **3.2.2.4 Physical Assets**

Transportation between the fishing communities and the outsides is not convenient, especially for school, health centre and the market. Some of the fishing communities are close to the school and health centre but some of the fishing communities are far away from the school and health centre. Most of the fishing communities have tap water but some of the communities still have to buy the water for drinking from town, or get water from well. The sanitation situation in the communities is generally good. All the fishermen have their own fishing boats and fishing

tools. Generally the old fishermen have non-motor boats and the young fishermen have motor boats. Most of the households have TV sets and telephones; some have the refrigerators, bikes and mobile-phones. Few of the households have motorcycle.

#### **3.2.2.5 Financial Assets**

The financial assets of fishermen are mainly composed by the households' income, government subsidizes, loan and savings. The households' incomes are mainly from fishing and the salary of their children who get a job in the town or city. The government subsidizes are diesel oil subsidy and allowance for disable household members. The diesel oil subsidy started from 2006 and each year the government provides the subsidy to the fishermen who own the fishing license according to the price of the diesel oil and the horsepower of the fishing boat. When the fishermen meet difficulties, such as schooling for the kids or medical treatment, they may borrow money from their relatives but not from the bank because they do not have the mortgage assets for loan. The wealthy households with member working in town or city have savings according to the survey conducted in the three fishing communities. The wealthy households are all have income from their children or relatives who have a permanent job in town or the city. Most of the households' income depends on fishing only and the poorest households are always the elderly who live alone or the households with disabled members. The lives of the poorest households are very hard. Small loans are available from the credit cooperatives, but large loans are always carried out with mortgages which most fishermen can not provide.

#### **3.2.3 Received wellbeing**

Some of the fishermen enjoy the houses provided by the government. About 49 years ago, most of the fishermen lived in boats. At the end of 1960s, the government built the houses on land for the fishermen. As all these houses are very old now and some of the houses even collapsed after these years. If the fishermen want to build a new house there is no land for them. Now Shaoguan government provides tap water and electricity for the fishermen who live in the boats within the section in downtown city. The government is building houses for those fishermen there. Government began to subsidy the motor fishing boats since 2006 when the price of diesel increase sharply. But it is only given to the fishermen who have the fishing licence. The fishermen can join the medical insurance like residents in the city and town. However, only those better-off households can afford this. All the children of the fishermen can enjoy free education from primary school to junior secondary school, which alleviates the fishermen' economic burden from the education. The households with disable member can get 200 Yuan allowance per month from the government.

#### **3.2.4 Dependency on different ecosystem services**

The livelihoods of most fishermen depend on aquatic resources and fishing. The dependency of the fishermen on different ecosystem services is different which depends on the infrastructure conditions of each fishing communities. Some of the communities along the river bank have to use the water directly from wells or the river and some of the communities depend on the firewood

collected from river debris or nearby hills for cooking. The local fishermen do not consume aquatic plants directly.

### **3.2.5 Market networks**

Regularly the fishermen go fishing at night and sell the fish in early morning along the river or in the market. There are terminal market, retail market and free market in Shaoguan city. The terminal market is mainly for aquaculture products. Fishermen are seldom there since the catch amount per day is small. Generally the fishermen go to the retail market or free market and sell their fish directly to the consumers. The competition between fishermen and pond fishing farmers is minor because the amount of fish from the river is very insignificant compared with those from fish ponds.

Sometimes the traders or the restraint may go to the boat to buy the fish directly, but no formal or long-term cooperation exists. The fishermen consider that it is relatively convenient to sell the fish themselves directly to the end consumer. It does not require any formal permission, but only pay 1-2 Yuan for market place.

It is very clear that the social economic development has negative impact both on the aquatic resources and the livelihood of fishers in general (For more detail information, please see the WP3 Report and WP4 Report from China). Ways to solve this conflict should be worked out soon for sustainable development.

## **4. Legislation and Policy Analysis of sustainable management of aquatic resources in the HighARCS study site**

In this section, more detail analysis of the related legislation and policy in the region is presented and the actions which are already taken by local government are also introduced.

### **4.1 Laws and policies by management area**

China's environmental laws are made in accordance with respective environmental elements. For example, Fishing Act was made for the protection and development of fishing resources, and Water Pollution Control Act and Water Act were for water resources. Therefore, the following analysis on related laws and policies will also be in the same order of different environmental elements.

#### **4.1.1 Legal and Policy Analysis on the Protection and Utilization of Fishery resources**

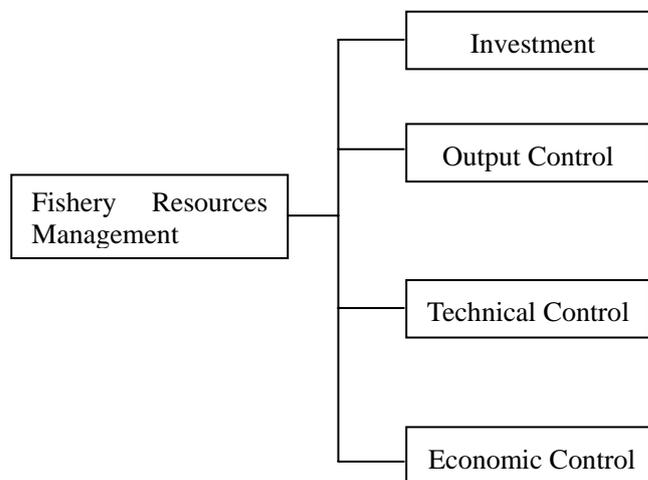
##### **4.1.1.1 General Introduction**

Since late 1970s to middle 1990s, China's legal rules on fishery resources in inland waters have taken its initial shape. It mainly includes: Aquatic Resources propagating Protection Ordinance (1979) , Wild Animals Protection Act of the People's Republic Of China (1988) , Fishery Act of the People's Republic Of China (1986) , Detailed Rules For the Implementation of The Fishery Act of the People's Republic of China(1987), Aquatic Animals And Nature Reserve Management Ordinance(1997), Fishing License Approval Ordinance for the Protection of Fishery Resources(1989), Fishery Resources Proliferation Tax Ordinance(1988).With this legislation,

China has established legal institutions on fishing license, fishery resources proliferation tax, no-fishing periods and no-fishing zones, prohibition of destructive fishing methods, limitations on fishable size, protection of larva and aquatic animals of important economic value, and thus formed a comparatively complete legal system on development, utilization, maintenance and management of fishery resources (Tang et al., 2010).

In mid-1990s, due to the fishing capacity surplus and fishery resources recession, China began to implement a series of fishing policies such as training and transferring fishermen to other occupations, no-fishing on Yangtze River in spring, to control the overdevelopment of fishing resources, and improve aquatic environment by proliferation discharge and artificial reefs construction, and modify the Fishery Act and Fishing License Approval Ordinance accordingly (Tang et al., 2010). Guangdong Province also make its own rules in accordance with national legislation which include: Guangdong Fishery Management Ordinance (2003), Fishing License Management Ordinance of Guangdong Province (1992), Collections Standards for Fishery Proliferation Tax of Guangdong Province(1989), Interim Collection Rules for Fishery Proliferation Tax of Guangdong Province(1989), Fishing License Approval Rules of Guangdong Province (1992), Important Aquatic Animals Fry Management Rules of Guangdong Province (1995) etc. However, detailed rules for the implementation of these laws are still to be made according to the specific conditions of each province or city and the law implementation also should be strengthened.

#### 4.1.1.2 Current Major Fishery Resources Management System



**Fig. 4 Management Framework for Fishing Effort and Fish Resources Protection**

According Fishing Act (revised in 1984), the management system for fishery focuses on the investment to fishery, output amount in fishery, technique used in fishery and the economic measures for fishery (Fig. 4). Investment control measures include fishing license permission and compulsory liquidation for those fishing boats that is out of serviceable periods. Output control mainly refers to the fishing quota system. Technical control are composed of measures such as

setting up no-fishing zones, no-fishing periods, the proper size and variety of fishing tools. Economic control takes the form of levying fishing resources proliferation and protection fees and tax.

#### **4.1.1.3 Major Problems of Related Legal Rules and Policies**

A. Some effective protection and management polices hasn't yet been adopted by the Fishing Act, which mainly include training and re-allocation of fishermen for them to take jobs other than fishing, and joint efforts for law enforcement on sand mining along the river banks. During our visits, we found that Shaoguan municipal government already had re-allocation plans for the fishermen living on boats along the city area, but this policy didn't cover those fishermen in rural areas.

B. The standards and detailed rules for fishery resources compensation are still not clear.

Action Plan for Aquatic Resources Protection in China (2006) has some rules concerning the compensation for fishery from the projects, which have negative impacts on aquatic resources, and requires governments of different levels to levy fishery resources compensation tax for the protection and proliferation of fishery resources. However, there are no authoritative agencies to assess the negative impacts and the total compensation amount. Recently projects such as hydropower dams, bridges and sand mining have attracted lots of a attention from the public, and the fishery agencies has also contributed considerable work in this aspect. The People's Political Consultative Conference of Shaoguan proposed to levy fishery resources compensation tax for the construction of hydropower dams on the river in 2000; the People's Congress of Shaoguan proposed a bill for the purpose of protecting the biological environment of Beijiang River in 2004; the People's Congress of Ruyuan county and the People's Political Consultative Conference of Lechang County also had similar proposals. The Fishery Agency of Shaoguan consulted the hydropower dams on the feasibility of charging them fishery resources compensation tax in 2004 and 2006, but due to the lack of authorization from formal legislations, the agency don't have the power to do more on this matter (Shaoguan Fishery Agency, 2008) . Because most of these proposals are related to laws and regulations which can only be revised or improved in the provincial level or even national level, the problems have not been solved yet.

C. Flaws in current legal rules

Firstly, the lack of fishing access threshold. Current law depends on fishing license and “double control” (i.e., control of both the number of fishing boats and the power of fishing boats) to curb the total effort in fishing. In fact, the specific conditions for get fishing license is not clarified in the laws except the requirements for the capacity of motorboats. Other requirements such as boats certificate and registration are for the purpose of fishing management only. As for requirement for the identity of fishermen, the size and sort of fishing boats and fishing tools are still needed to be set up.

Secondly, there is lack of scientific fishing statistics. Current statistics only covers fishing

output, while omitting other important parameters such as fishing time and fishing methods. As a result, there is almost no exact statistics number that can be used for scientific analysis for the purpose of resources protection. (Liu et al., 2008)

#### D. Problems in law enforcement process

There are two different reasons for the malfunction of some legal rules: one is due to loopholes in legislation, e.g., the fishing quota limitation, the other is due to the law enforcement process itself, which is evident in the following aspects:

—— The size and number of fishing tools remain unchecked.

Although Fishery Act of the People's Republic of China and Detailed Rules For the Implementation of The Fishery Act of the People's Republic of China set up a quota system for the total number and size of fishing tools, actually only the total number and power of fishing boats are under check.

—— The protection for fish fry is not implemented well.

Quota on the fishing of fish fry is also expressed in the Fishery Act, but this rule hasn't been fully enforced.

—— Dams built along the river do not have necessary measures for protection of fishing resources.

Fish passages were required by the PRC Water Act of 1988. For example, article 18 of it prescribed that the builders of dams which has serious negative impact on fishing resources should keep fish passages or take other necessary protective measures. The PRC Water Act of 2002 follows this rule and requires the builders to pay all the costs of such facilities. But no one of the more than 20 big power stations along the trunk and branch streams of Beijiang River has built any fish passages or takes other remedial measures so far.

—— Environmental Impact Assessment (EIA) has not been effectively implemented in resources protection.

Article 3 of PRC Environmental Impact Review Act (2002) stipulate: "Any projects that have negative impact on environment within the territory under the jurisdiction of PRC should conduct EIA". And according to article 25, "any project that fails environmental impact review should not be permitted to begin construction". Therefore, EIA should be conducted before the construction of dams. However, most of the dams along the upstream of Beijiang River didn't perform EIA and they are by no means the only ones in China. There two major reasons for this situation: one is that the related governmental agencies didn't enforce the law strictly; the other is due to contradictions between different rules. For example, article 31 provide that any construction builder who start his project without prior EIA qualification license from the related governmental agencies should be required to halt the project and apply for EIA license immediately. Actually this article 31 opens an escape door for construction builders and in effect is contradictory to article 25 of the same law, for it makes it possible for construction builders to start their projects first and make it legal later while article 25 absolutely forbids such maneuvers. Furthermore, sand

mining has taken another toll for the spawning sites of aquatic resources.

—— Inefficient coordination between different law enforcement agencies.

In accordance with Article 35 of the PRC Fishing Act, anyone who conducts underwater operations and potentially has negative impact on fishing resources should consult with fishing agencies at county level or higher level beforehand and take necessary preventive measures to prevent this happens. In case of any damages to the fishing resources happens, the delinquent action should be stopped and it will take the responsibility for the recovery of the resources. But this article is too abstract to have any real effect on those operations.

#### **4.1.2 Analysis of the laws and policies on biodiversity**

##### **4.1.2.1 General Introduction**

China's constitution of 1982 protects rare species. Article 9 of the constitution stipulates that the state encourages reasonable utilization of natural resources and protects rare species. Wildlife protection Act of 1988 shares the same view. Ocean Environment Protection Act of 1995 attaches great importance on the protection of ecosystem. Desertification Act of 2001 designate different functional zones for the purpose of development planning.

##### **4.1.2.2 Major management measures**

The establishment and management of natural reserves is one of the major means of maintaining biodiversity. Nine conservation areas with area more than 3,780 ha have been set up in order to protect the biodiversity in Shaoguan. (Bureau of Environment Protection of Shaoguan, 2009) The protection species include Asian giant soft-shell turtle, marbled eel, wattle-necked soft-shell turtle etc. At the same time, crude fish killing methods such as explosion, poison or electricity were prohibited. Fishermen get their Fishing License from Shaoguan Fisheries Administration Team. There are 180 families with a Fishing License at present. Efforts as fry releasing, "returning the grain plots to forestry", establishing management system for the protection of key national protected wild animals and plants, have been strengthened in the past decade. (Department of Environment Protection, 2008)

##### **4.1.2.3 Major Problems of Related Legal Rules and Policies**

###### **A. The Protection list is too short.**

Constitution and Wildlife Protection Act only protect rare or endangered species on the national or provincial list (see the attached table 1, table2 and table 3 in Appendix), while those not on the list, but are important for livelihood are not strictly protected by law.

###### **B. Rules on restoration and sustainable development of biodiversity are still very weak.**

Current laws are more concerned about the protection than about the restoration and sustainable development of natural resources. Both the Constitution and Environment Protection Law haven't adopted sustainable development as one of the basic principles for biodiversity.

###### **C. Unreasonable delineation of powers usually results in either inefficiency or conflict.**

The law classifies various species into two major sorts: aquatic and terrestrial, and delineate jurisdictional powers accordingly. However, some species are not easy to be classified as aquatic

or terrestrial, and this dilemma usually leads to conflict or vacuum of different jurisdictions.

### **4.1.3 Analysis of water pollution control laws and policies**

#### **4.1.3.1 Related laws and policies**

General legal principles on water pollution control were promulgated for the first time in the Environment Pollution Act of 1979, in accordance with which a series of water environment standards were later passed by the state. Water Pollution Control Act (1984), Interim Rules for Water Pollution Discharge License Management (1988) and Pollution Control Rules for Reserved Drinking Water Area (1992) were also passed one by one since 1984. Water environment standards cover surface water quality, farmland water quality, fishing water quality and pollution discharge. To enhance the treatment of water pollution and make best use of pollution fund, Water Pollution Control Act was amended in 1996, and new rules on river drainage area management and coordinated treatment of urban sewage was added (Wang et al., 2006). In 2008 Water Pollution Control Act was amended for the second time to adopt rules on government responsibility, total amount control, pollution discharge management, emergency control and civil damages.

#### **4.1.3.2 Major management measures**

Major management measures for water pollution control already adopted in laws include: pollution discharge fees, water environment standards and monitoring, total quantity control. Plan for water supply and demand should be made. Activity of mass harvesting ground water or surface water should be permitted only by getting governmental license. Different functional zones of water resources should be set up. Resources for drinking water both from underground and surface will be protected. Pollutant discharging by enterprises and individuals alike should be strictly restricted in terms of quality, concentration and total discharge.

#### **4.1.3.3 Major loopholes in related laws and policies**

##### **A. Conflict in supervision provided by different government agencies**

Related government agencies for water management are mainly on the quantity of water but not on the quality, while Water Pollution Control Act empowers the environmental agencies with the authority to monitor water quality. As a result, government agencies for water management don't have the law enforced power on biological matters when they are managing water resources. Furthermore, other government agencies like construction, agriculture, fishing, shipping, geology and mining also share certain authority on water administration, but there are almost no coordination mechanisms between them, which lead to partitioned administration power to the intake, consumption, and discharge of water.

##### **B. Lack of coordination between different administrative areas**

Although the power to monitor water quality lies in the hand of environment agencies, but even they are powerless when faced with trans-jurisdictional cases, but rivers are flowing and pollutions usually come from the upper reaches of the river. Current laws don't provide operational methods on the legal responsibilities of areas in upper and middle river reaches if they

pollute the water which finally runs into the lower river reach.

### **C. Too much deliberation power but little feasibility for the law enforcement agencies**

Many rules are quite ambiguous as to the authority of law enforcement agencies and protection of aquatic resources. The punishment for serious pollution accidents are not harsh enough to make up for the damages. (Nie , 2009)

#### **4.1.4 Analysis on forestry laws and policies**

##### **4.1.4.1 Introduction**

Early forestry laws limit lumbering volume and guarantee the growth of forestry for the purpose of sustainable production. For example, Forest Act of 1979 classified the primary function of forests was to satisfy the needs of economic construction and daily consumption, while functions like air purification, health enhancement were listed as secondary. Forest Act of 1984 changed this order to make environmental functions first, and Forest Act of 1998 attached great importance to ecological functions.

##### **4.1.4.2 Application of the major legal rules**

Forest protection troop and forest police are established to facilitate the forestry protection and the reduction of forestry fire and pests. Saplings should be quarantined for possible pests. Governments should encourage tree planting and adopt a quota and license system to control lumbering. Long-term loan should be granted for tree planting projects. Lumbering, mining and other construction projects should be taxed to collect fund for the restoration of forests. Returning slope farmland to forests should be subsidized.

##### **4.1.4.3 Loopholes and conflicts in current laws and policies**

###### **A. Forest ownership**

Forests in China are generally divided into three categories: state-owned, collectively owned and privately owned. However, the boundary of forest ownerships are not that clear. Take state-owned forests for example, the power demarcation between central government and local governments are not clarified so that the actual administrator of forests usually is found to be vacant.

###### **B. Governmental responsibilities**

The legal responsibilities of forestry agencies include both protection and production, which often conflict with each other.

###### **C. Forest Protection awareness**

Though awareness of the necessity of forest protection has improved since the revision of Forest Act, forest protection usually make way for forest economic development due to the lack of specific and applicable ecological protection rules.

###### **D. Forest taxes and fees**

The ecological compensation tax doesn't take a conspicuous stand in the forest taxes and fees system. (Wang et al. 2006) Current forest tax and fees system relies more on various fees than on taxes. Various fees are the prices charged for the public services provided by government while

the taxes are within the public finance system which is more reliable and stable.

#### **4.1.5 Analysis of the laws and policies related to the livelihoods of fishermen**

##### **4.1.5.1 There are no effective fishing organizations.**

Though some fishing villages were founded in Shaoguan in 1950s and 1960s, they are only collective autonomous production organizations instead of administrative units and have no formal institutional framework. Currently the fishing villages are usually put under the jurisdiction of adjacent sub-district offices which actually have no full administrative power over those villages. As a result, the fishermen cannot defend their interests effectively by means of complaint to higher authorities. One example is the fishing village of Li Shi, whose party secretary is said to be corrupt, but the villagers don't know how to dismiss him or his son who succeed him on this office.

##### **4.1.5.2 The legal status of fishermen is too uncertain to enjoy enough social security or other preferential policies.**

Most fishing villages are located in rural area, but they don't own any land or enjoy preferential policies that are made for the sake of farmers. According to the state registration system, fishermen are city residents, but neither those residents' committees in the neither cities nor villagers' committees in the countryside take the responsibility of their livelihood.

In fact, the income of most fishermen is very unstable and it is hard to be counted as low income family, so it is difficult for them to apply for low income subsidy.

##### **4.1.5.3 Health care for fishermen is inefficient.**

Because fishermen are considered to be city residents but not farmers, the costs of their health care are of the same standards as those city residents. According to the Implementation Rules for Medical Insurance of City Residents in Shaoguan (2007), the costs of medical insurance of city residents in Shaoguan are jointly paid by the individuals and governments, with the former paying 120 Yuan and the government pay another 52 Yuan. Most of the Fishermen whom we interviewed thought that the cost of medical insurance was still too high for them to buy. Though the Implementation Rules for Medical Insurance of City Residents in Shaoguan also states that low-income families are fully subsidized by the government, fishermen families aren't qualified for that. (Shaoguan Fishery Agency, 2005)

##### **4.1.5.4 Inefficient communication between hydropower stations and fishermen**

It often causes damages to the fishing nets when hydropower stations open water gates to release flood, but fishermen cannot get compensation for their loss.

#### **4.2 Assessment of the strengths and weaknesses of current efforts of protecting biodiversity of aquatic resources in the area**

In Guangdong Province and Shaoguan municipal area, many steps have been taken to ensure the sustainable use and protection of aquatic resources. We will introduce the actions and also point out the weak points in this section.

##### **4.2.1 On-going efforts**

Efforts from Guangdong Province will be introduced first and then the efforts in Shaoguan

municipal area.

#### **4.2.1.1 Laws and Policies of Guangdong Province**

##### **A. Demarcation of function zones**

The eleventh five-year plan of Guangdong province of 2005 put forward the aim of setting up different function zones and the mechanism of ecological compensation, another governmental document of 2008 also make statements to the same effect. Function Zones Plan of Guangdong Province (2009-2020) defines 12 counties along the Beijiang River as ecological development zones, and intends to make compensations for them according to their out flowing ecological effects.

##### **B. Measures taken in Beijiang Drainage Area**

Overall planning as well as allocation schemes have been undertaken for the water resources in this area. Emergency preplans for water allocation will be carried out when there are serious droughts. Different function zones have also been designated in order to reserve a reasonable amount of water. The amount of pollution discharge is based on the cleaning capacity of the river. Water quality data should be able to be access by the public.

##### **C. Measures taken to protect wetlands**

An overall plan should be formulated for the protection of wetlands according to their function. Survey and supervision of wetlands should be conducted to establish wetlands files for information exchange and the promotion of wetlands protection. Damages to wetlands are forbidden and should be compensated.

##### **D. Measures taken to protect the fry and parent of rare aquatic animals**

Fishing of the fry and parent of rare aquatic animals should be under strict supervision and control. A special license is needed for the importation of alien species. When catching, buying, importing or exporting the fry of any rare aquatic species happen, special fee should be paid for the multiplication and conservation activity of aquatic resources.

##### **E. Limitations on sand mining**



**Fig. 5 Sand mining operation in Beijiang River**

Mining zones, non-mining zones as well as no-mining periods should be announced to the

public. Licenses should be granted through public bidding for sand mining. Any such license should not last longer than one year. The amount and method of sand mining should be specified beforehand, and miners should pay river resources tax and compensation fee for the restoration of the river.

#### **F. Measures taken to protect drinking water**

Overall planning for the protection of drinking water in both rural and urban areas should be undertaken to set up protection zones. Any lost caused by the setting up of these protection zones should be compensated. Construction projects that discharge pollution should be prohibited in drinking water zones. Governments should promote the application of ecological agriculture and pollution control facilities such as biogas system. Emergency preplans for contamination accidents on drinking water should be made.

##### **4.2.1.2 Policies and measures of Shaoguan**

Activities which have been strengthened include the breeding and releasing fishes, surveying aquatic resources, stopping net-cage fish culture in some rivers and reservoirs, planting ecological forests, setting up biological fireproof zone and nature reserves, supervising bidding activity for sand mining by coordinating efforts from different law enforcement agencies such as departments of environment protection, water preservation, and land planning, making overall plans for the protection of ecology and resources, and improving law enforcement effort. Development Plan for Ecological agriculture in Shaoguan (2008-2015), Development Plan for Fishing in Shaoguan (2008-2015-2020) and Development Plan for Water Management Agency (2008-2010)) have been made. Investigating law infringement cases in large-and-medium reservoirs have been conducted. The fishing departments both Guangdong province and Shaoguan city have setup fish reserves and no-fishing zones in the upper reaches of Beijiang River.

The local government (Shaoguan city) has taken many effective steps to protect water resources and to improve water quality of Beijiang River.

—— To abandon industries which cause heavy water pollution.. Many pollution producing small steel factories, iron factories and cement factories has been stopped. The production capacity of these factories reached 83 thousand tons of steel, 30 thousand tons of iron and 88 thousand tons of cement in the last five years. And the reduction of pulp and paper sludge, grain industry, dyeing industry and electroplating industry has been strengthened.

—— To enforce the waste water treatment measures for major industries and to invest more in the infrastructure for environmental protection.

Through improving wastewater treatment techniques and optimizing the water circulation system, industrial wastewater released by Shaoguan Smelter reached the standard and water reuse rate reached 96.3%. The discharge of industrial wastewater was reduced from 2412 m<sup>3</sup>/h down to only 300 m<sup>3</sup>/h.

The Shaoguan Iron & Steel Group has invested 110 million Yuan for the reform of Meihua River and the establishment of a waste water treatment center. After that, 40% of the industrial

wastewater discharged reached the environmental standards, and the other 60% has been recycled after further treatment. The industrial water circulation rate now reaches 98%. Discharge of industrial wastewater reduced from 2412 m<sup>3</sup>/h down to only 300 m<sup>3</sup>/h. (see section 2.2.2 in WPI Report from China)

Guangdong Dabaoshan Mining Industrial Co. Ltd. has also taken steps to improve environmental quality of its mining activity, such as the improvement of the drainage system of tailing, the conservation of water and soil, the increase of the holding capacity of the sediment detention reservoirs.

Restaurants on the river have also taken steps to reduce water pollution by for the simple removal of suspended solids and oil.

—— Town sewage and waste treatment

Seven domestic wastewater treatment plants (WWTP) had been established in 2007. The total treatment capability reached 140,000 t per day. The second phase of the second WWTP (50,000 t per day), the second phase of Qujiang WWTP (20,000 t per day), WWTP of Ruyuan county (15,000 t per day), WWTP of Wengyuan county (15,000 t per day), WWTP of Renhua county (10,000 t per day), WWTP of Pingshi town Lechang city (10,000 t per day) have been established in year 2008. The total domestic wastewater treatment capability of Shaoguan has reached 260,000 t per day. The industrial wastewater treatment rate has reached 80%. Moreover, 23.3 km waste pipes attached to wastewater treatment plants have also been established. (Bureau of Environment Protection of Shaoguan, 2009)

In 2008, 8,915,000 t of industrial solid wastes were produced in Shaoguan city. The treatment capacity was 1,371,100 t, and the amount of discharged industrial solid wastes was 19,500 t. The storage capacity was 958,400 t. The recycle rate of industry solid waste reached more than 80%. The first phase (600 t per day) of Hualazhai sanitary landfill for domestic wastes with investment of 0.12 billion RMB has been established and put into use. The goal of harmless disposal of domestic wastes has been achieved. (Bureau of Environment Protection of Shaoguan, 2009)

——Environmental protection in rural area.

Major agricultural pollutant sources of the Beijiang River include animal husbandry, overuse of pesticides and fertilizers in non-scientific ways, and household sewage discharge. Strategies for water environmental protection in agriculture include: 1) Reinforcing the environmental management of animal raising farm and avoid pollution from animal excrement. 2) Developing eco-agriculture and extend biogas application. 175 thousand biogas pools will be established before 2010. 6566 t per year COD discharge will be cut off. 3). Reinforcing the management of agricultural chemicals. The amount of pesticide and fertilizer application will be reduced and bio-fertilizer, organic fertilizer, bio-pesticides, green feed and green feed additive will be more widely used. (Government of Shaoguan City, 2003)

#### **4.2.2 Cooperation, capacity and performance of implementing agencies**

The law enforcement agencies in grassroots usually just don't have enough personnel,

finance or legal authority. The law enforcement officers need further training to acquire necessary expertise and techniques to accomplish their job. The communication among government departments was not enough. For example, the Bureau of Fishery and local government didn't know that Nan-Shui reservoir was assigned as drinking water resources by provincial government and encouraged investors to grow fish there. The Bureau of Water Management who in charge of sand mining management didn't know the exact location of the aquatic resources protection zones and allowed sand mining activity in those protected area. How to coordinate the activities managed by different bureaus and departments is a challenge for watershed management.

#### **4.2.3 The role and effectiveness of civil society and local community organisations**

The fishing villages are very limited in their functions as local community organizations, which are usually limited to issuing birth certificates and death certificates, etc. Complaints are often heard from the fishermen to the fact that the fishing villages didn't actually defend their interests.

#### **4.2.4 Legal Coherence**

A brief review on the coherence of laws among nation, Guangdong province and Shaoguan municipal area is carried out in this section.

##### **4.2.4.1 Coherence between national laws, provincial laws, and local laws**

**A. Many laws are too vague to be operable and many local laws don't reflect local characteristics.**

Laws on the national level usually provide major principles and it is the local laws that make detailed implementation rules accordingly. However, local governments either refrain from making new rules in fear of conflicting with national laws or just copy national laws without any local characteristics. The function of people's congress in provincial level and city level should be strengthened.

##### **B. Rules-making ability of local governments is limited.**

Time limitation for the law-making procedures of local legislatures is not specified, thus constant postponement happens when there are serious disagreements. For example, the Law of Nature Reserves is still in the process of discussion after the Environment and Resource Committee of the National Congress proposed its first draft. Furthermore, in accordance with Legislation Act of PRC (2000), the local administration and legislature of Shaoguan have no law-making power. Though they can make some normative documents, these documents are under strict restrictions so that they don't contain rules on administrative punishment, administrative license, tax and fees, compulsory measures and other matters that are deemed as important legal rights. In fact, these normative documents are mainly directed to government agencies rather than individuals and enterprises.

##### **4.2.4.2 Coherence between national laws and international treaties**

###### **A. Wetland Protection**

After accession to international treaties as Convention on Wetlands of International

Importance Especially as Waterfowl Habitat (1971), Convention on Biological Diversity (1992), China have not made a special law which takes many elements of wetlands as a whole. In 2002 national government promulgated Wetlands Protection Action Plan of PRC that listed more than 300 sites with global significance. Later some local governments also made wetlands protection laws accordingly, but lack of public involvement and ambiguities hampered their enforcement. (Wang et al., 2008)

### **B. Biodiversity protection**

China became a signatory country to Convention on Biological Diversity in 1992 and published a state report on its performance early this century. Special laws are made for each aspect of biodiversity, but prevention of alien species and biological security still need more legal rules.

### **C. Ecosystem service protection and eco-compensation**

Millennium Ecosystem Assessment funded by the UN and report No. 16 of the ninth contracting parties conference of the wetlands convention put forward proposals for ecosystem service protection and eco-compensation. Though China hasn't introduced specifically the idea of ecosystem service, the protection of ecosystem boosted the protection of ecosystem service. Programs like HighARCS will surely have positive impacts on cultivating awareness of ecosystem service. Eco-compensation already finds its way into China laws and policies, but the following problems still exist:

The rights, obligations and legal liabilities of interested parties are not clear enough;

Legal rules lag behind ecosystem service protection;

Distinctions between economic development stages of east, middle and west parts of China need more consideration (Wan et al., 2005).

### **D. Rights protection of infringed parties**

Many countries loosened judicial restrictions on the maintenance of infringed parties' rights. One example is the 1970 Environment Protection Act of the US. Environmental public interest litigation has been heatedly discussed by the Chinese academic circle, and the founding of such legal system still needs more time.

Aarhus Convention of EU (The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters) has the best rules on public participation. China also introduced this system in its Environmental Impact Assessment Act and Interim Rules for Public Participation in Environmental Impact Assessment, which, if put to practice, can do good to environment, but the procedure and sphere of public participation need to be more specific to have some real effects on justice in environmental matters.

## **5. Facilitating Policy Action-Planning**

In this section, after we introduce some actions already taken in Shaoguan, more detail

analysis on the attitudes of different stakeholders on the importance of strengthening of different actions by Delphi method is presented.

## **5.1 Existing programmes for environmental management and sustainable livelihoods**

### **5.1.1 Artificial fry release**

The purpose of artificial fry release is to restore the population of wild fishes, shrimps, crabs and shellfishes by means of artificial release of cultivated fry. Shaoguan adopted a mode of “society involvement under government guidance” to conduct artificial fry release. People can donate money to buy fish fry and also can join the releasing activities, but it is the Fishing Monitoring Team in Shaoguan who decide when, how and what to release in order to avoid negative effects such as the escape of invasive species from fish releasing activities. Some artificial fry release sites have also been designated.



**Fig. 6 Fish fry releasing platform in Beijiang River within Shaoguan City**

### **5.1.2 Ecological protection project**

Government agencies are responsible to make sure that forest resources is protected and natural preserves is strengthened to protect animals, plants and wetland resources. Their focus is on the construction of forestry for ecology and water conservation along Beijiang River. High pollution activities like cage culture are restricted in recent years. Biological and engineering measures is taken for watershed management and erosion control. Agreement on the significance of setting up ecological compensation system has been reached.

### **5.1.3 Environmental protection project**

Sewage treatment plants will be developed to ensure that the plants in the downtown area, Qujiang and Lechang can be finished by the end of this year. Water pollution and solid wastes will also be controlled and treated. The treatment rate for waste water from city daily discharge will

reach more than 60%, and from industry discharge will reach more than 90% by year 2010. More than 50% of the industrial solid waste will be reused. 50% of the garbage will be treated with harmless method. All hazard material will be treated safely.

#### **5.1.4 New countryside construction plan**

The new countryside construction plan includes the construction of infrastructure and the improvement of public affairs in rural area. The construction of infrastructure includes tap water system, road system, sanitation system, energy saving stove, housing improvement, and garbage and sewage treatment system including biogas system. The improvement of public affair will focus on the input of the government to education, sanitation, culture and security of the society in countryside. The 9-years-free-education will be improved and popularized. Senior secondary education will be supported in the countryside and the skill training will be emphasized for the farmers. Social security system in countryside will be set up especially for those who lost their land or belong to the poorest. The new cooperative health system will be improved to cover more farmers into the system. But not all the fishermen are the resident of countryside and some of the fishermen belong to the town and therefore they not only can not enjoy all the welfare of the farmers, but also can not enjoy all the welfare of the citizens.

#### **5.1.5 Housing plan**

The housing plan of city and town includes the construction of low price housing and low rent housing to help the low-income household in city and town. The project of reforming the old housing for the poorest in the countryside and the fishermen who live in the boat will be developed. The government is preparing to provide houses for 127 households who live in the boat within the city area in 2012 and help them to find a job. This plan is being pushed forward ahead of schedule and going to be finished by the end this year.

#### **5.1.6 Female and children**

The lawful rights and interests of female and children will be secured. The employment of female and their participation into the society will be improved. The development of female and children in the mountainous area will be improved. Housing for the poor, health treatment and children' education will be improved.

### **5.2 Action-planning approach pursued in HighARCS**

#### **5.2.1 Stakeholder analysis**

Theoretically, every one living in the watershed is a stakeholder of the aquatic resources. More specifically, stakeholders in this study are referred to those whose interests are significantly under direct influence caused by the changes from the aquatic resources of the study site. They are mainly include: fishermen, government officers from different bureaus such as agricultural bureau, aquatic production bureau, environmental protection bureau etc, company leaders from different business companies such as hydropower stations, sand mining companies, boat restaurants, iron and still factory, mining company etc. Based on the interviews and discussions with the

stakeholders during our field visits, the relations among them are listed as follows:

Impact of hydropower stations on fishing communities: as water level rises with the building of hydropower stations, the species and amount of fishes in the river decreases, some lands along the riverbank submerge into water, and the adjacent houses might end up in collapse. Slowdown in river current also changed the essential environment condition for certain fish species, and harmed the traditional fishing industry.

Impact of sand mining on fishing communities: the drinking water of fishing folks is contaminated; aquatic resources deteriorate when the oil and waste discharged in the process of sand mining polluted the water and ruined the spawning habitats of fishes and shellfishes.

Impact of boat restaurants and other polluters on fishing communities: waste discharged by boat restaurants and other polluters contaminates the drinking water and bring damages to the fishing industry.

Relations between Shaoguan fishery monitoring team and fishing communities: the legal responsibilities of fishery monitoring team include the issue of fishing permit, the supervision of the tool used for fishing, and the representation of government to relocate fishermen, to deliver subsidize, and to train fishermen.

Relations between Environmental Protection Bureau and hydropower stations, sand miners or boat restaurant: the legal responsibilities of Environmental Protection Bureau include the reviewing of environment impact assessment result, the granting of pollution discharge license, the collection of pollution tax, and the monitoring of pollution discharge from those industries.

Relations between Water Resources Bureau and Hydropower Stations: Bureau of Water Resources is in charge of the reviewing of applications for hydropower station projects and applications for water intake, the collection of water resources tax, and the monitoring of water storage and water discharge activities.

Relations between Water Resources Bureau and sand miners: Water Resources Bureau is in charge of the reviewing of the applications for sand mining and the monitoring of the mining process.

## **5.2. 2 Stakeholders' evaluation on ecosystem services**

The HighARCS Chinese team went to Shaoguan for interviews with stakeholders including fishermen, governments, enterprises, and farmers on the ecosystem services of Beijiang River from 20th to 22nd of May, 2010.

**Methods:** All major types of stakeholders had their representatives for the evaluation. The specific man or woman from government or industry companies were decided by themselves. The fishers and farmers were chosen by us randomly in farming villages or fishing villages. There were totally 27 government officers, 17 industry leaders, 132 fishers (62 women, 70 men), and 25 farmers who joined our evaluation. For government officers and industry company leaders, we explained the evaluation sheet for them by using ppt in a meeting room, then had a group discussion for further understand the meaning of each ecosystem services. Then they gave their

evaluation independently from 1 for very unimportant to 5 for very important. For famers and fishers, we explained the evaluation sheet for them in individual base. We collected the sheets for further statistic analysis by using statistic software SPSS.

The four groups of stakeholders were:

(1) Government officers from Mayor’s office, courts, Development and Reform Bureau, Tax Bureau, Agriculture Bureau, Forestry Bureau, Aquatic Products Bureau, Environment Bureau, and Industry and Commerce Bureau;

(2) Representatives of related enterprises from the Da-BaoShan Mining Company, the Shaoguan Steel Co., the Pig Association of Shaoguan, the director of Wujiang Villagers’ committee (fish culture), the Golden Earth Company (also fish culture), Wujiang Rhizoma Dioscoreae Association, Shaoguan Institute of Fisheries Research, Fish Culture Association which is an autonomous organization with about 100 fish cultivation farmers, mining companies, cotton companies, hydropower stations, Farmers Development Company, restaurants;

(3) Fishers from Lishi, Kengkou and Zhoutian fishing villages;

(4) Farmers near the three fishing villages.



**Fig. 7 A meeting with stakeholder in the meeting room of Shaoguan municipal government**

**Table 1 The ecosystem services and the order of evaluation result from different stakeholders**

\* The red colour indicates the first 10 most important ecosystem services recognized by different stakeholders, the green colour indicates the 5 least important ecosystem services recognized by different stakeholders, and the black colour indicates the 8 ecosystem services in the middle range. The \*\* indicates that there is statistically significant difference in the evaluation result among different stakeholders for this ecosystem service.

**Results:** The order of evaluation from different groups of stakeholder is presented in table 1. The evaluation result shows that many views of all the four groups were quite similar. For example, they all agreed that daily water supply, clean environment, reducing flooding, and deleting pollutants were within the top 10 ecosystem services. The function for swimming is not

Ecosystem services	Gover. Officers	Comp. leaders	Fishers	Farmers
1 irrigation**	4	2	19	4
2 daily water use	1	1	4	3
3 industrial water supply**	9	4	23	19
4 aquatic products**	10	16	1	7
5 sand for construction**	15	10	22	11
6 transportation	18	12	18	18
7 hydro-electricity**	8	5	15	6
8 game fishing	21	21	16	21
9 boating	20	20	17	22
10 tourism	16	19	21	20
11 swimming	22	22	20	23
12 air humidity	15	15	14	8
13 stable air temperature	14	8	10	13
14 clean environment	5	5	8	1
15 reduce flooding	3	3	5	2
16 delete pollution	2	6	3	5
17 reduce diseases	6	14	5	9
18 biodiversity	7	11	13	15
19 residential value**	17	17	7	16
20 beautiful environment**	11	20	11	12
21 spiritual home	12	7	9	14
22 education	13	9	6	10
23 research	19	18	12	17

important. However the fishermen paid more attention to ecosystem services relative to their life such as provision of aquatic resources (4.32 points), provision of living environment (4.41 points), and fishing or angling (2.88 points) than other three groups. However, the fishers paid less attention to irrigation, and sand mining than the other three groups. Marks given by government officers and enterprise representatives on ecosystem services do not have significant difference.

There are three ecosystem services in table 1 should be noticed. They are irrigation (1), industrial water supply (3) and sand for construction (5). While government officers, company leaders and farmers are considered that irrigation are one of the top 4 ecosystem service, fishers ranged it as one of the 4 least important ecosystem services. While government officers and company leaders were considered that industrial water supply was one of the top 10 ecosystem

services, fishers and farmers considered it as one of the 4 least important services. For sand produced from river, company leaders considered it as one of the top 10 ecosystem services; however fishers considered it one of the two least important ecosystem services. Government officers and farmers ranged sand mining in the middle. It can be explained that sand mining is important for industrial development, hence is important for company leaders, however, it destroys the habitat of many aquatic species and has negative impact on the livelihood of fishers. This is also can be used to explain the difference in the evaluation on hydro-electricity.

Some of the conflicts can be seen here. It is worth to be solved in the future action plan.

### **5.2.3 Result of the State of System Workshop in Shaoguan**

The HighARCS research team held a State Of System Workshop with the stakeholders. We discussed with them about our findings and invited them to talk about their ideas on related laws, government policies and ecological services of Beijiang River in the meeting room of Shaoguan municipal government on May 21, 2010. Workshop was divided into two sections. The stakeholders involved in the morning section came from different government departments. The stakeholders joined the afternoon section mainly from industrial, agricultural and commercial companies. During each section, Prof. Luo Shiming used PPT to show them our understanding and outcomes of the situation in Beijiang River Watershed. After we discussed the situation, they filled the form we provided anonymously and independently. They gave marks in (1) agree with our understanding, or (2) disagree with our understanding. The result showed that the majority of them agreed with our understanding. The percentages supported our view were 96.4% for forestry management, 95.2% for reservoir management, and 95.2% for dam and hydropower station management, 85.7% for sand management, 85.0% for waste water management and 88.2% for livelihood of fishers. However if we compare the answers from government officers and company leaders, some difference could be identified. In general, the supporting rates from the government officers were higher than those from the company leaders. In the forms they filled, we got more written idea from company leaders than from the government officers. Exception existed in our view on the management of hydropower station and livelihood of fishers where higher supporting rates were from the company leaders. During the State of System workshop we had some new findings such as the conflicts between tourism and the protection of drinking water, the existing explosive method for fishing by fishers, the government officers' great attention on GDP without enough attention to fish resources and biodiversity, and the weakness of communication among stakeholders, should be noticed in the future action plan.

## **5.3 Delphi method on attitude of stakeholders on management measures**

In order to understand the attitude of stakeholders towards different strategy of management, a three round Delphi method was adopted.

### **5.3.1 Methods**

The first round of Delphi interviews was conducted from 20th to 22nd of May, 2010, the second round from 2<sup>nd</sup> to 3rd of July, 2010, and the third round from 1st to 2nd of October, 2010. All three rounds of interviews took place in the project site of Shaoguan.



**Fig. 8 An interview in a fisher's house with the housewife**

The stakeholders involved included: (1) Government officers from Mayor's office, courts, Development and Reform Bureau, Tax Bureau, Agriculture Bureau, Forestry Bureau, Aquatic Products Bureau, Environment Bureau, and Industry and Commerce Bureau; (2) Representatives of related enterprises from the Da-Baoshan Mining Company, the Shaoguan Steel Co., the Pig Association of Shaoguan, the director of Wujiang Villagers' committee (fish culture), the Golden Earth Company (also fish culture), Wujiang Rhizoma Dioscoreae Association, Shaoguan Institute of Fisheries Research, Fish Culture Association, Mining Companies, cotton companies, hydropower stations, Farmers Development Company, restaurants; (3) Fishermen from Lishi, Kengkou and Zhoutian fishing villages; (4) Farmers from Pingfu, Fengcun, Maowu, and Yangshapo villages. In the first round of Delphi method, the person participated the evaluation of ecosystem services also joined the Delphi investigation. The later feedbacks for the second and third round of Delphi investigation were through direct interview for fishers and farmers and through telephone and mailing for government officers and company leaders.

Major legal measures and policies proposed by the HighARCS team fall into two categories: one is related to environment protection, and the other to fishermen livelihoods. Each contains fourteen specific legal measures and policies. These questions were listed in a form (see Table 2) which were filled by each individuals independently according to their own understanding after our explanation in the first time or after our feed back of the previous results in the later two times.

After we gather all forms filled by stakeholders, statistic was conducted by using SPSS 13.0. Further analysis was based on the statistical result.

**Table 2. Questionnaire of Delphi method for policy and management issues  
for different stakeholders in Shaoguan City**

<p><b>A. How do you think the importance of the legal measures and policies related to environment protection? Please mark each choice from extreme important (5), very important (4), important (3), less important (2), or not important (1).</b></p> <ul style="list-style-type: none"> <li>(1) Industrial Pollution Control</li> <li>(2) Sand Mining Control</li> <li>(3) Dams Control</li> <li>(4) Ban of direct dumping of garbage</li> <li>(5) Control of fertilizer and pesticide</li> <li>(6) Ban of direct discharge of sewage by boat restaurants</li> <li>(7) Forestation</li> <li>(8) Mandatory requirements for the building of passages for fish and boats</li> <li>(9) Artificial discharge of fish fries</li> <li>(10) Limitation on fishing tools</li> <li>(11) Monitoring and publicizing water quality</li> <li>(12) Control of water reservation of dams</li> <li>(13) Ban of caged culture in reservoirs</li> <li>(14) Limitation of poultry farming</li> </ul> <p><b>B. How do you think the importance of the legal measures and policies related to fishermen livelihoods should be considered in the near future? Please mark each choice from extreme important (5), very important (4), important (3), less important (2), or not important (1).</b></p> <ul style="list-style-type: none"> <li>(15) Oil subsidy</li> <li>(16) Medical care</li> <li>(17) Reduction of Tax and fees</li> <li>(18) Reduction of administrative procedures</li> <li>(19) Renovation and building of cheap low-rent houses</li> <li>(20) Professional training</li> <li>(21) Improvement of roads to fishing villages</li> <li>(22) Building of tap water facilities</li> <li>(23) Maintenance grant to the poorest</li> <li>(24) Providing job information</li> <li>(25) Compensation for the damages to fishermen by hydropower stations</li> <li>(26) Centralized processing of garbage</li> <li>(27) Compensation for the damages to fishermen by sand mining companies</li> <li>(28) Fishermen organization</li> </ul>
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### **5.3.2 The results**

In general, our stakeholders gave very different important scores to different management and policy measures (Table 3 C). The average scores given from different stakeholders were also different very significantly (Table 3, A). Different stakeholders gave significant different important values to different policy and management measures (Table 3 cross effect of A×C). Their changes in different rounds were significant ( Table 3 A×D). Although there were no significant differences among the average scores of each round in the three round Delphi method (Table 3 D), there were significant changes happened in different round of Delphi investigation for different management policy (Table 3 C×D). There was no significant different existed between the average scores of men and women (Table 3 B), however there were significant different existed in some specific policy and management measures between sex groups (Table 3 B×C).

More detail explanation will be presented in the following sections.

**Table 3 The Statistic result of variance analysis on the important value given by different stakeholders for different policy and management measures\***

Dependent Variable: importance value

Source	Sum of Squares of the differences	Degree of Freedom	Mean Square*	F**	Significance***
Difference among occupation of stakeholders (A)	98.452	3	32.817	25.302	.000
Difference between sex group (B)	2.281	1	2.281	1.758	.185
Difference among different management and policy measures (C)	326.225	27	12.082	9.315	.000
Difference among different rounds of Delphi method (D)	.333	2	.167	.129	.879
cross effect of two factors(A×C)	443.124	81	5.471	4.218	.000
cross effect of two factors(B×C)	60.089	27	2.226	1.716	.012
cross effect of two factors(C×D)	97.313	53	1.836	1.416	.026
cross effect of two factors(A×D)	41.838	5	8.368	6.451	.000
Error	7525.377	5802	1.297		
Total	103101.000	6002			
Corrected Total	9761.853	6001			

\* Mean Square= (Sum of Squares of the differences)/ (Degree of freedom). It measures the difference affected by the specific factor indicated in the left of this row.

\*\* F value= Mean Square/ (the mean square of the random error, or 1.303 here). It indicates the significance of the difference. The larger the number, the more significant the difference is.

\*\*\* The number indicates statistically significant impact of the factor if it is less than 0.05 or very significant if it is less than 0.01. Otherwise it indicates the influence of the factor is insignificant.

#### 5.3.2.1 The importance range of policy and management measures

Table 4 shows that our stakeholders gave their most attention to the measures (in red colour in table 4) which included (1) industrial pollution control, (2) sand mining control, (16) medical care for fishers, (23) maintenance grant to the poorest, (15) oil subsidy for fishing boat, (19) solve housing issue for fishers' family, and (25) getting compensation form hydropower stations for the reduction of fish resources.

**Table4. The importance of each policy and management measures evaluated by different stakeholders**

\*The red parts indicate the important management measures which are highly evaluated by stakeholders. The green parts are considered unimportant by stakeholders. The importance of the black parts is ranged in between red and green parts.

Some measures which stakeholders considered unimportant (green colour in Table 4), include (13) Ban of caged culture in reservoirs, (14) limitation of poultry farming, (10) limitation on fishing tools, (12) control of water reservation of dams, (7) forestation at this stage, (18) reduction of administrative procedures, (24) providing job information for fishers, (28) strengthening of

policy and management measures	Average Scores	Subsets with different number have significant difference by Duncan's Multi-range test
<b>Part 1</b> improvement of resources and environment		
(1) Industrial Pollution Control	4.42	11 12 13
(2) Sand Mining Control	4.32	9 10 11 12 13
(9) Artificial discharge of fish fries	4.14	8 9 10
(4) Ban of direct dumping of garbage	4.07	7 8 9
(5) Control of fertilizer and pesticide	4.07	7 8 9
(3) Dams Control	4.04	6 7 8
(11) Monitoring and publicizing water quality	4.04	6 7 8
(6) regulation on sewage from boat restaurants	3.97	5 6 7 8
(8) Building of dam passages for fish and boats	3.84	4 5 6 7
(7) Forestation	3.71	4
(12) Control of water reservation of dams	3.68	4
(10) Limitation on fishing tools	3.25	3
(14) Limitation of poultry farming	2.74	2
(13) Ban of caged culture in reservoirs	2.46	1
<b>Part 2.</b> improvement of the livelihood of fishers		
(16) Medical care	4.54	13
(23) Maintenance grant to the poorest	4.43	12 13
(15) Oil subsidy	4.42	11 12 13
(19) solve housing issue	4.34	10 11 12 13
(25) Compensation form hydropower stations	4.32	9 10 11 12 13
(22) Building of tap water facilities	4.19	8 9 10 11 12
(27) Compensation form sand mining companies	4.18	8 9 10 11 12
(26) Centralized processing of garbage	4.17	8 9 10 11
(21) Improvement of roads to fishing villages	4.05	7 8
(20) Professional training	4.01	6 7 8
(17) Reduction of Tax and fees	3.81	4 5 6
(28) Fishermen organization	3.79	4 5 6
(24) Providing job information	3.73	4 5
(18) Reduction of administrative procedures	3.61	4

fishermen organization, (17) reduction of tax and fees which have already reached zero for some years for farming and fishing, and (8) building of dam passages for fish and boats. The important scores of other measures (in black colour in Table 4) were considered in the middle range.

### 5.3.2.2 The influence of stakeholders' occupation on their views of related measures

Stakeholders' occupation and social status have significant influence on their evaluation of

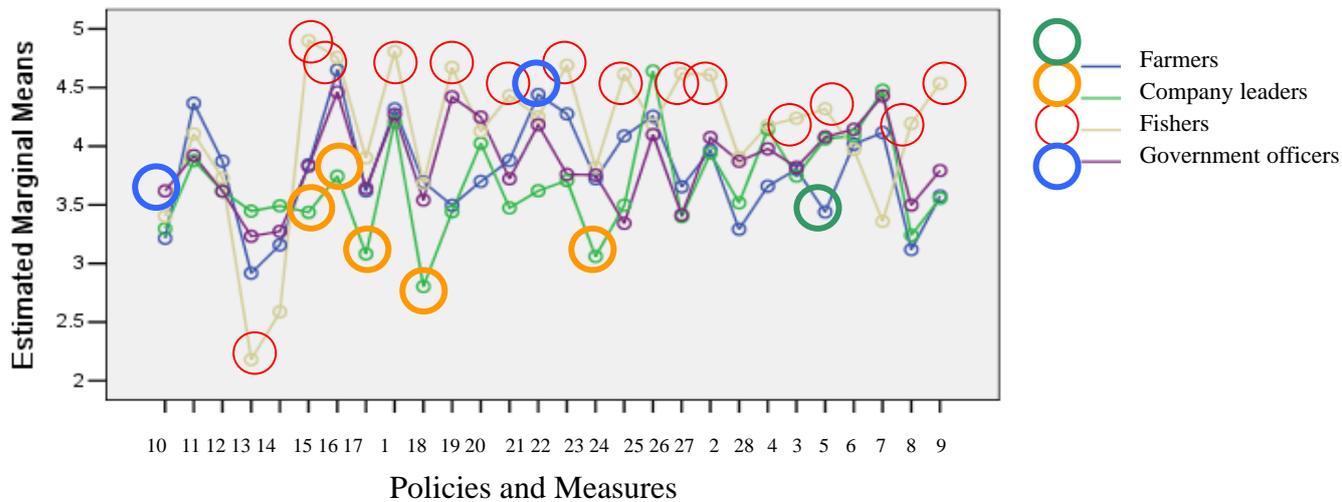
the related measures. Four groups of people with different background which included leaders from enterprises, officers from government, farmers and fishermen, took part in our Delphi research. Table 5 shows their average important scores given for the 28 proposed measures. It can be seen that fishers are more eager for the change than other three groups. The representatives from enterprises are paid much less attention to the issue of environment, resources and the livelihood of fishers.

**Table 5 The impact of occupation groups of the stakeholders by using Duncan’s multi-range test method.**

Stakeholder groups	Sampling size*	Average scores **		
		3	2	1
Company Leaders	518	3.67		
Government officers	799		3.81	
Farmers	1006		3.81	
Fishers	3679			4.05

\* Sampling size= number of person \* number of evaluation values given by each person

\*\* The difference between average evaluation values appeared in different column is statistically significant.



**Fig.9 The different attitude of different types of stakeholders towards different management and policy and measures**

The number denoted in the horizontal axis is the same number of policy or measure indicated in table 2 above.

From Fig. 9, it can be seen quite clear on how the occupation affected the attitude of stakeholder for their evaluation of different management and policy measures. For example, fishers gave much higher important value than government officers, farmers and industrial leaders on subsidy for fuel (17), reduction of industrial pollution (1), fishers’ housing issue (21), improvement of infrastructure of fishing villages (23), continue the poor relief policy (25), compensation from dam building (27) and sand mining (29), regulation on sand mining activities

(2), control the increase of hydropower station (3), control the increasing use of chemical fertilizer (5), improving the dam operation for the crossing of fish and fish boat (8), and the increase of fish releasing activity (9). However fishers paid much less important value to the abandon of net-box fish raising method (13) and the reduction of fishery along the river (14). However, leaders from industrial companies gave much lower level of importance to the medical care system reform for fishers (18), the reduction of government fee collection (19) and reduction of government permission affairs (20), improvement of infrastructure for fishing villages (23), and more information about employment for fishers (26). Farmers gave much lower important scores on the reduction of chemical fertilizer (5). The average scores from government officers were quite close to the average in general and only gave slightly higher important score in limitation on fishing tools (10) and improving tap water facility (22).

These differences indicate the need for information exchange, education and coordination for different stakeholders.

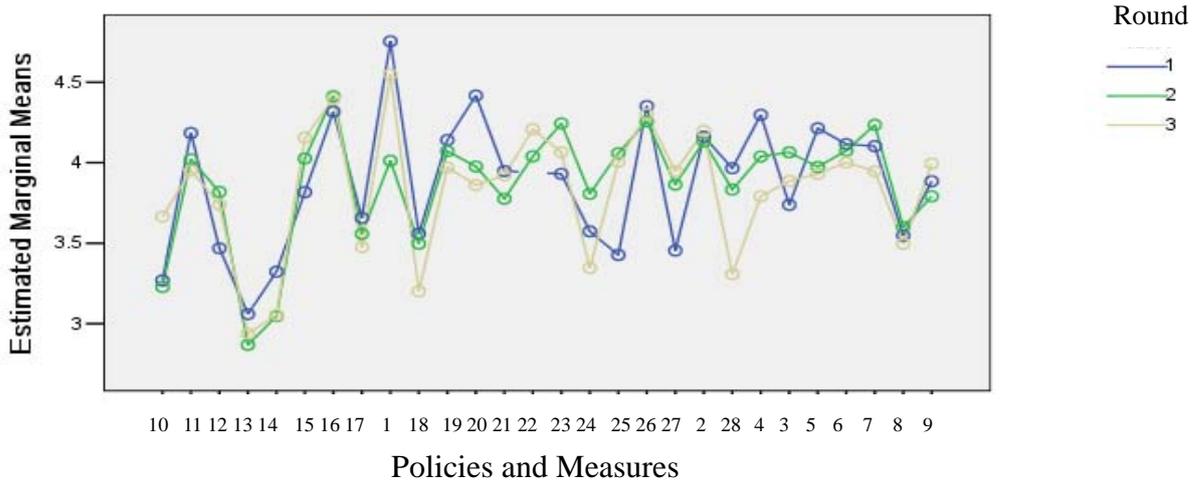
### 5.3.2.3 The impact of different rounds of the Delphi exercise

The Delphi investigation results of each round was given back to the stakeholders to help them get some ideas of what others think and thus try to find some common ground. The three rounds of interviews are quite similar in average scores without significant difference (Table 6). However, there were some changes for different measures in different rounds of Delphi investigation (Fig. 10) . The important scores gradually decreased from the first round to the third round for the measures such as reducing government permission affairs (20), improving the organization level of fishers (30), and employment training for fishers (22). On the other hand, the important scores were gradually increased for the following measures such as continue the fuel subsidy for fishers (17), construction of drinking water supply system (24) and increase the fish fly releasing activity (9). This shows that the communication among stakeholder did make more people understand the situation of fishing population and fish resources.

**Table 6 The impact by different rounds during Delphi interview  
by Duncan’s Multi-range test method**

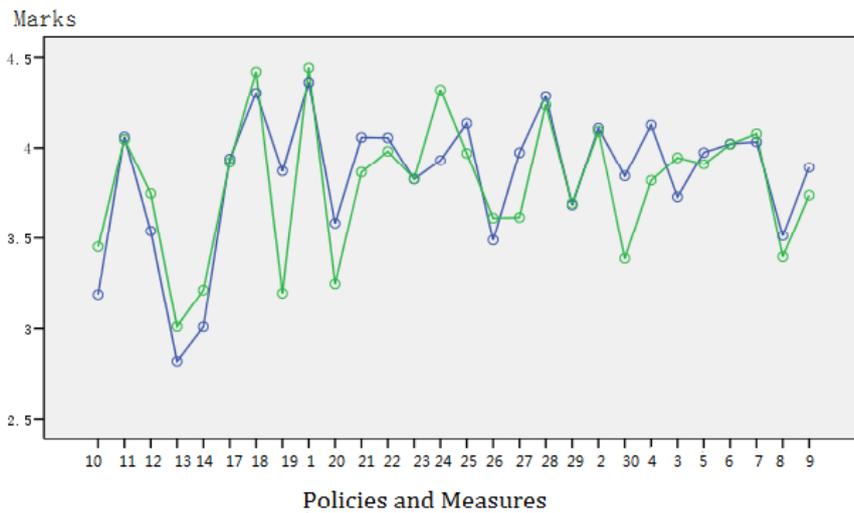
Round number in Delphi method	Sampling size	Average scores *
1	1162	3.89
3	1455	3.94
2	3385	3.96

\* The difference between average evaluation values appeared in the same column is statistically insignificant.



**Fig. 10 The average important scores in the three round of Delphi investigation.**

The number in the horizontal axis is the same number of policy or measure indicated in table 2 or table 4 above.



**Fig.11: Impact of Sex group on the average score of each measure**

The number in the horizontal axis is the same number of policy or measure indicated in table 2 above.

The number in the vertical axis is the average important values given by men (blue) or women (green)

### 5.3.2.4 The impact from sex groups

Generally males and females have quite similar views on most of the proposed measures (as what is showed in Fig.11 below). There is no significant difference between the average important scores from men (3.833) and women (3.787). However, they do have distinctions in some of the measures. For example, males tend to be more sensitive on management issues. They gave higher marks to measures such as “reduction of tax and fees (17)”, “reduction of administrative procedures (18)”, and “improvement of fishermen organization (28)” then females. Females tended to care more about daily life, so they gave higher scores on item such as “building of tap

water facilities (22)".

The Delphi method is a useful tool for the participation and communication among different stakeholders for the complex issues like watershed ecosystem management.

## 6. DPSIR analysis

The Driver-Pressure-State-Impact-Response (DPSIR) analysis is a powerful tool to analysis the social economic situation and is helpful to find out conflicts and solutions.

In **social and economic** aspects, the **drivers** come from the growing population in the region. They form a pressure on improving their live standard. At present, the **state** is that most of the population in Shaoguan city can improve their life with the economic growth. However, the poorest part such as the social status of fishers is declining. Also the gap between the rich and the poor is increasing. This may have negative **impact** in the stability of the society. The **response** of the government is quite active. Measures such as poor alleviation plan, zero tax for farm products, allowance for the disable persons, free 9 year education, cooperative medical care system etc. However much have to be done in the future such as fisher's organization.

In **physical and technical** aspects, the **drivers** come from quickly changing land use pattern. The **pressures** come from the habitat destruction of many aquatic resources by dam building, by water pollution, by sand mining and by explosive method for fishing etc. The **state** of the aquatic resources is decreasing. Not only the amount is decreasing, but also the number of species is decreasing. The **impact** is very negative for the livelihood of fishermen. The number of fishers decreased and the fish harvested reduced. The ecosystem services provided by the Beijiang River are threatened by increasing frequency of flooding, by polluted water and by soil erosion etc. The local government has taken steps (**responses**) to reverse the situation by actions such as more restrict on the management of sand mining activity, setting up fish preserve area, setting up of no fishing season from 2011, releasing artificial raised fish fry, setting up more sewage treatment plant, strengthening reforestation process etc. However, the efficiency for the implementation of those actions is still needed to be improved.

In **political and institutional** aspects, the **drivers** come from the multi-factors and multi-disciplinary nature of the sustainable development and preservation of aquatic resources in the region. This gives a **pressure** on setting up a well communication and coordination system among different sections of the society. It also gives a great **pressure** on the legislation and policy makers who usually have their discipline limitation for understanding the whole story. The **state** is that although legislation and policy framework has been set up, more workable details are often lacking. Although leader of local government can coordinate the effort of different departments of the government, the daily activities are still quite separated with each other and the channel opened for communication and coordination is not enough. These situation have negative **impact** on the system such as the incident of eutrophication in Nanshui reservoir in 2009 because local government didn't know that is the drinking water resources, the sand mining activity in the fish

preserving area because water management bureau did not get the information about the preservation zones. The negative impact also appeared in how to collect and expend the ecological compensation fee from sand mining companies and hydro-power stations. It seems that the local government has not aware this situation and has not taken enough **responds** to improve the communication and coordination systems. Due to the limitation of the legislation power, the local people's congress has also taken very few responds to the situation.

One of the exercises on the DPSIR is shown in table 7 below.

**Table 7 A DPSIR analyses for the aquatic resources and livelihood of fishers in Beijiang River watershed, China**

	<b>Drivers</b>	<b>Pressures</b>	<b>State</b>	<b>Impact</b>	<b>Response in action</b>	<b>Future Response</b>
<b>Social/ Conflict/ Schism</b>	● education for working capability	● Education level	● low education level	● low working capability ● Less urban employment opportunity for fishers	● Working capacity training	●
	● Health care	● Payment for medical care	● No health insurance	● Worse health and heavier medical burden	● Government share payment for health insurance and endowment insurance	● Establish health insurance and endowment insurance
	● Accommodation	● Building house and land use	● Some fishermen have no house and dwell in fishing ship	● Safety challenge for no-house fishermen	● Government build house for fishermen, and assign land for house building	●
	● Elder fishermen life	● Life support for elder fishermen	● No endowment insurance for fishermen	● Elder fishermen depend on income of fishing until passing away	● Building water supply and sewage treatment system in fishing village.	● Set up elderly welfare system which include fishers
	● Sanitation infrastructures	● water supply and sewage treatment system	● 76.34% towns have a water supply system, but only 16.13% towns have a sewage treatment system and only 33.33% towns have garbage collecting systems.	● Some fishermen have to buy drinking water ● Garbage emitted to the river directly.		
<b>Technical</b>	● Fishing	● Fishing equipment	● Quality of net is not good	● Repair and replace net in short time	● Improve quality of equipment	●
<b>Physical/ Environmental/ Ecosystem Services</b>	● Hydropower dam ● , ● Sand mining, ● Fishing, ● Restaurant, ● Steel factory, ● Resident Households	● Water use, ● Dredging, ● Pollution or toxicity substance (pyrite, tin and oil, etc) emission, ● Intensive fishing, ● Crampfish, ● Waste depositing, ● Accumulation of sediment of the dams	● The lost of rare species (Sinilabeo decorus, Sinilabeo discognathoides,etc), ● The major fish species are lower valued species (Saurogobio dabryi Bleaker, Hmculter leucisxulus, etc), common mollusc species(Libertina, Largillierti, etc) ● The lost of native submerged plants (Vallisneria natans, Hydrilla verticillata, etc)	● Water quality deteriorate, ● Soil erosion, ● Water flow slower, ● Biodiversity and population of freshwater species decline, ● Conservation of species are very rare(Asian giant soft-shell turtle, marbled eel, hilsa herring, wattle-necked soft-shell turtle, Luciobrama macrocephalus), ● Collapse of the river banks, ● River bed sinking	● Fry releasing, ● Limit emission, ● control fishing, ● Build protected area, ● Forbid cramp fish, ● Waste treatment	● limit or forbid dam building and sand mining, ● Build artificial fish nests, ● Build fish passage on dam,

<b>Political/ Institutional/(PIPs)</b>	<ul style="list-style-type: none"> <li>● Fishery resources</li> <li>● Fresh species biodiversity</li> <li>● Water quality</li> </ul>	<ul style="list-style-type: none"> <li>● Fishery resources protection and management</li> <li>● Fishery resources compensation</li> <li>● Biodiversity protection and management</li> <li>● Pollution emission</li> </ul>	<ul style="list-style-type: none"> <li>● Lack of fishing access threshold,</li> <li>● No clear compensation standard and procedure rule</li> <li>● Lack of rule on biodiversity restoration</li> <li>● Lack of coordination between government agencies</li> </ul>	<ul style="list-style-type: none"> <li>● Intensive fishing</li> <li>● No fishery resources compensation</li> <li>● Fresh species biodiversity decline</li> <li>● Enforcement of rule on water protection is weakened by poor coordination</li> </ul>	<ul style="list-style-type: none"> <li>● Fishing quota limitation</li> </ul>	<ul style="list-style-type: none"> <li>● Forbid fishing on spawning season</li> <li>● Establish fishery resources compensation system</li> <li>● Legislation on biodiversity restoration</li> <li>● Establish a coordinating mechanism between government agencies</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>● Children education ,</li> <li>● Life consumption,</li> <li>● Fishing,</li> <li>● Accommodation,</li> <li>● Hydropower dam,</li> <li>● Sand mining,</li> </ul>	<ul style="list-style-type: none"> <li>● Tuition for children education,</li> <li>● Payment for life consumption,</li> <li>● Fees for fishing equipments and government management,</li> <li>● Freshwater species decline,</li> <li>● Accommodation rent</li> </ul>	<ul style="list-style-type: none"> <li>● Loan from relatives for tuition,</li> <li>● 2,000-3,000 Yuan for fishing tackles and about 1,000 Yuan for repair the boats and nets per year,</li> <li>● 105 Yuan annual fee for fishing license,</li> <li>● No compensation from Hydropower dam and</li> <li>● Sand mining factory</li> </ul>	<ul style="list-style-type: none"> <li>● Decline in the per person income,</li> <li>● Few savings</li> <li>● Fish capture decrease</li> </ul>	<ul style="list-style-type: none"> <li>● Subsidized diesel oil from the government</li> </ul>	<ul style="list-style-type: none"> <li>● Government provide education loaning</li> <li>● Compensation to fishermen from dam and sand mining factory</li> </ul>

## **7. Issues to be addressed in policy action plans**

### **7.1 Key problems in the upper stream of Beijiang River to be tackled**

During the Delphi investigation with the stakeholders, the following problems came out to the surface as major problems needed to be tackled:

- the restoration of aquatic resources
- improvement of water quality
- quantity limits of hydropower stations and making them more environment friendly
- regulation of sand mining
- pollution control in boat restaurants and steel factories
- more coordination in the law enforcement process of related government agencies
- improvement of fishermen's livelihood
- raising environment awareness of stakeholders

### **7.2 Preliminary advice on policymaking**

7.2.1 Conduct a comprehensive survey on the ecological resources and environment of the whole Beijiang river drainage area so as to lay a solid basis for future law making and enforcement. Similar surveys taken in the past only focused on the fishing potential and water quality of the middle and lower reaches of the river. Therefore, the data collected hereby are quite partial and inconclusive.

7.2.2 Adopt a comprehensive method in protecting the ecological environment along the river to ensure the sustainable development of both economy and biological resources. The protection of ecological environment involves efforts from government agencies in water conservancy, fishing, environment protection, and shipping, etc. It means a need to integrate the capabilities of all the concerned law enforcement agencies to fulfill the following aims: Firstly, a strict implementation of environmental assessment on programs related to the watershed area and river system to minimize their negative impact on environment; Secondly, rehabilitation of the ecological environment in the drainage area, which entails rational operation of dams along the river to facilitate the seasonal migration of aquatic organisms; Thirdly, more protection for the water resources within the drainage area to prevent further pollution.

7.2.3 Establish a coordinating mechanism such as a committee under the Shaoguan municipal government among the fishing, environment protection, water conservancy, agriculture, forestry and shipping agencies of all the counties and prefectures in the drainage area.

7.2.4 Promote consensus through education and propagation in the mass media on the necessity to enforce laws on environment protection and sustainable development of aquatic organisms.

7.2.5 Take different strategies in accordance with the situation of different parts of the area. The spawning sites of fishes are to be given great emphasis along the whole river, while natural reserves should be built in river reaches and tributaries where biological species are abundant and peculiar, and the major task in the middle and lower reaches of the river is the restoration of

ecological functions.

7.2.6 Intensify the enforcement of rules as closed seasons and ban on sand pumping and commercial fishing, and give guidance to those fishermen who intend to change their traditional life and fishing patterns.

7.2.7 Build artificial fish nests for the restoration of fishing resources

Decrease of aquatic plants on the riverbed, which leads to the disappearance of natural fish nests, is an important reason for the decrease in amount of fish and number of species. Artificial fish nests provide a chance to change the situation.

7.2.8 Subsidize and train fishermen to improve their livelihood.

It is necessary to subsidize more fishermen because not all of them can benefit from the diesel oil subsidy policy. But in the long run professional training is also important to help them getting more job choices.

7.2.9 Improve social security system for the fishermen and gradually help them get non-fishing jobs.

Most of the fishermen interviewed didn't buy medical insurance. Given the fishermen population keeps decreasing, and most of their next generation are not willing to go on with their father's living along the river, the government might help pay part of the fishermen's medical care, safeguard the basic living expenditure of the poorest families, and offer free training programs to the middle-aged and young folks in the fishing villages to make them better prepared for jobs in towns.

7.2.10 Establish grassroots fishermen organizations and guarantee them with the same treatment of urban dwellers.



**Fig. 12** After an interview with a fisher (second from right) in Kengkou Fishing Village

## 8. Conclusion and Discussion

Shaoguan municipal area locates in Beijiang River watershed and covers the major part of the upper region of this watershed. The legislation and policy frameworks for the protection and sustainable use of aquatic resources in the region have been set up from national level, provincial level to the municipal level. There are legal rules related to environment protection, wild animal protection, protection of water resources, protection of forestry, farmland resources protection. There is also local policy related to improving the livelihood of the fishers. However the actual situation of aquatic resources and the livelihood of fishers in the region are not very well. The development of industry and economy caused serious conflicts with the conservation of natural resources in Beijiang River. The livelihood of fishers is becoming harder and harder in the past years.

A detail analysis on the legislation and policy related to the sustainable management of aquatic resources in the region is carried out. Major problems include the need for more specific policy for the implementation of law, the strengthening of law enforcement, the flaws in existing legal rules. The protection list of wild life is too short. The rules on restoration and sustainable development of biodiversity are still very weak. The separation of responsibility and lack of coordination for pollution control and water quality control in the watershed existed. The low standard of ecological compensation, the lack of effective fishers' organization, and the lack of communication among different parts along the river system is discussed.

Some of the policy which has been carried out is also introduced. Beijiang River Watershed has been decided as an ecological development and buffering zone. A comprehensive regional planning has been made for the next five years. Shaoguan municipal government has refused the entrance of industries with heavy pollution. More measures of pollution control have been adopted by many existing industries and the government. Artificial fry release, ecological protection projects, new countryside construction plan, housing plan for low-income families have also been carried out by local government.

The coherence between national laws, provincial laws and local laws are discussed. Some existing limitations are analyzed. Rule-making ability of local government is limited and very weak. The lack of public involvement and ambiguities should be changed for wetland protection. The legal rules related to invasive species should be developed soon. Legal rules related to ecosystem service and eco-compensation is needed to be formed.

In order to understand the attitude of stakeholder on our understanding of the system, we held a state of system (SOS) workshop. Very high (85%-96.4%) positive responses on all aspects of our understanding of the system have achieved. However, some new information also appeared during the workshop. An investigation on the evaluation of ecosystem services also conducted. The contracting views on industrial water supply, sand mining, and irrigation, the big difference in evaluation on aquatic products, hydro-electricity, residential value and aesthetics value have been noticed and should be considered in future action plan. Delphi method was adopted for evaluation

of future management measures for conservation of aquatic resources and improving the livelihood of fishers. The result shows that sex group and different round of investigation did not have significant impact on the evaluation. However the occupation has significant impact on evaluation. Fishers are more eager to have policy change than other groups of stakeholders. In general, stakeholders agree that the most important measures for preservation of resources are industrial pollution control, sand mining control, and the most important measures to improve the livelihood of fishers include improvement of medical care system, welfare for the poorest, oil subsidy for motor in fishing boat, improve housing situation, and receive compensation from hydropower station. A Driver-Pressure-State-Impact-Response (DPSIR) method for situation analysis is also used.

This institution, policy and management analysis will benefit a more specific action plan for sustainable use and protection of aquatic resources in Beijiang River Watershed, China. It can also serve as an in-depth example to understand a more general situation in China.

### **Acknowledgement**

Although this report was written by us, it is actually the result of common effort of our HighARCS team in South China Agricultural University which includes 18 faculty members and also many students joined our research. We would also like to thank for the cooperation of local government officers, industrial leaders, farmers and fishers who took part in our investigation and research. Not only they provided material and information, they also accepted our interview and filled our questionnaire. Dr. Soren Lund gave us very good advice after his review and his visit to China in May 2011. This version is the result of revision according to his suggestion.

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## Appendix

**Attached Table 1 National Key Wildlife Protection List**  
(Promulgated by the Forestry Department and Agriculture Department in 1989)

Chinese Name	Scientific Name	Classification	
		Class I	Class II
兽纲 MAMMALIA			
灵长目	PRIMATES		
懒猴科	Lorisidae		
蜂猴(所有种)	Nycticebus spp.	I	
猴科	Cercopithecidae		
短尾猴	Macaca arctoides		II
熊猴	Macaca assamensis	I	
台湾猴	macaca cyclopis	I	
猕猴	Macaca mulatta		II
豚尾猴	Macaca nemestrina	I	
藏酋猴	Macaca thibetana		II
叶猴(所有种)	Presbytis spp.	I	
金丝猴(所有种)	Rhinopithecusspp.	I	
猩猩科	Pongidae		
长臂猿(所有种)	Hylobates spp.	I	
鳞甲目	PHOLIDOTA		
鲛鲤科	Manidae		
穿山甲	Manis pentadactyla		II
食肉目	CARNIVORA		
犬科	Canidae		
豺	Cuon alpinus		II
熊科	Ursidae		
黑熊	Selenarctos		II
	Thibetanus		
棕熊	Ursus arctos		II
(包括马熊)	(U.a.pruinosus)		
	Helarctos		
马来熊	malayanus	I	
	Procyonidae		
浣熊科	Ailurus fulgens		II
小熊猫	Ailuropodidae		
大熊猫科	Ailuropoda		

大熊猫	Melanoleuca	I	
鼬科	Mustelidae		
石貂	Martes foina		II
紫貂	Martes zibellina	I	
黄喉貂	Martes flavigula		II
貂熊	Gulo gulo	I	
*水獭(所有种)	Lutra spp.		II
*小爪水獭	Aonyx cinerea		II
灵猫科	Viverridae		
斑林狸	Prionodon pardicolor		II
大灵猫	Viverra zibetha		II
小灵猫	Viverricula indica	I	II
熊狸	Arctictis binturong		
猫科	Felidae		
草原斑猫	Felis lybice (=silvestris)		II
荒漠猫	Felis bieti		II
丛林猫	Felis chaus		II
猞猁	Felis lynx		II
兔狲	Felis manul		II
金猫	Felis temmincki		II
渔猫	Felis viverrinus		II
云豹	Neofelis nebulosa		
豹	Panthera pardus	I	
虎	Panthera tigris	I	
雪豹	Panthera uncia	I	
		I	
*鳍足目(所有种)	PINNIPEDIA		II
海牛目	SIRENIA		
儒艮科	Dugongidae		
* 儒艮	Dugong dugong	I	
鲸目	CETACEA		
喙豚科	Platanistidae		
* 白鲸豚	Lipotes vexillifer	I	
海豚科	Delphinidae		
* 中华白海豚	Sousa chinensis	I	
* 其它鲸类	(Cetacea)		II
长鼻目	PROBOSCIDEA		
象科	Elephantidae		
亚洲象	Elphas maximus	I	
奇蹄目	PERISSODACTYLA		
马科	Equidae		
蒙古野驴	Equus hemionus	I	

西藏野驴	Equus kiang	I	
野马	Equus przewalskii	I	
偶蹄目	ARTIODACTYLA		
驼科	Camelidae		
野骆驼	Camelus ferus (=bactrianus)	I	
麋鹿科	Tragulidae		
麋鹿	Tragulus javanicus	I	
麝科	Moschidae		
麝(所有种)	Moschus spp.		II
鹿科	Cervidae		
河鹿	Hydropotes Inermis		
黑鹿	Muntiacus crini frons	I	
白唇鹿	Cervus albirostris	I	
马鹿 (包括白臂鹿)	Cervus elaphus (C.e.macneilli)		II
坡鹿	Cervus eldi	I	
梅花鹿	Cervus Nippon	I	
豚鹿	Cervus porcinus	I	
水鹿	Cervus unicolor		
麋鹿	Elaphurus Davidianus		II
驼鹿	Alces alces		
牛科	Bovidae		
野牛	Bos gaurus	I	
野牦牛	Bos mutus (=grunniens)		II
黄羊	Procapra gutturose	I	
普氏原羚	Procapra	I	
藏原羚	Przewalskii Procapra		II
鹅喉羚	Picticaudate Gazella		II
藏羚	Subgutturosa Pantholops	I	
高鼻羚羊	Hodgsoni Saiga tatarive	I	
扭角羚	Budorcas taxicolor		
鬣羚	Capricornis	I	
台湾鬣羚	Sumatraensis Capricornis crispus		II

赤斑羚 班 羚	Naemorhedus cranbrooki		
塔尔羊	Naemorhedus goral		II
北山羊	Hemitragus	I	
岩 羊	Jemlaicus		
盘 羊	Capra ibex	I	
	Pseudois nayaur		II
	Ovis ammon		II
兔形目	LAGOMORPHA		
兔 科	Leporidae		
海南兔	Lepus peguensis		II
雪 兔	Hainanus		II
塔里木兔	Lepus timidus		II
	Lepus yarkandensis		II
啮齿目	RODENTIA		
松鼠科	Sciuridae		
巨松鼠	Ratufa bicolor		II
河狸科	Castoridae		
河 狸	Castor fiber	I	
鸟 纲 AVES			
鸛形目	PODICIPEDIFORMES		
鸛形科	Podicipedidae		
角鸛	Podiceps auritus		II
赤颈鸛	Podiceps grisegena		II
形目	PROCELLARIIFORMES		
信天翁科	Diomedidae		
短尾信天翁	Diomedea albatrus	I	
鹈形目	PELECANIFORMES		
鹈鹕科	Pelecanidae		
鹈鹕(所有种)	Pelecanus spp.		II
鳶鸟科	Sulidae		
鳶鸟(所有种)	Sula spp.		II
鸬鹚科	Phalacrocoracidae		
海鸬鹚	Phalacrocorax pelagicus		II
黑颈鸬鹚	Phalacrocorax niger		II
军舰鸟科	Fregatidae		
白腹军舰鸟	Fregata andrewsi	I	
鸛形目	CICONIIFORMES		
鹭 科	Ardeidae		
黄嘴白鹭	Egretta eulophotes		II
岩鹭	Egretta sacra		II
海南虎斑	Gorsachius Magnificus		II

小苇	<i>Ixobrychus minutus</i>		II
鸛科	Ciconiidae		
彩鸛	<i>Ibis leucocephalus</i>		II
白鸛	<i>Ciconia ciconia</i>	I	
黑鸛	<i>Ciconia nigra</i>	I	
鸚科	Threskiornithidae		
白 鸚	<i>Threskiornis</i>		II
	<i>Aethiopicus</i>		
黑 鸚	<i>Pseudibis papillosa</i>		II
朱 鸚	<i>Nipponia nippon</i>	I	
彩 鸚	<i>Plegadis falcinellus</i>		II
白琵鹭	<i>Platalea leucorodia</i>		II
黑脸琵鹭	<i>Platalea minor</i>		II
雁形目	ANSERIFORMEA		
鸭科	Anatidae		
红胸黑雁	<i>Branta ruficollis</i>		II
白额雁	<i>Anser albifrons</i>		II
天鹅(所有种)	<i>Cygnus spp.</i>		II
鸳鸯	<i>Aix galericulata</i>		II
中华秋沙鸭	<i>Mergus squamatus</i>	I	
隼形目	FALCONIFORMES		
鹰科	Accipitridae		
金雕	<i>Aquila chrysaetos</i>	I	
白肩雕	<i>Aquila heliaca</i>	I	
玉带海雕	<i>Haliaeetus</i>	I	
	<i>Leucoryphus</i>		
白尾海雕	<i>Haliaeetus albicilla</i>	I	
虎头海雕	<i>Haliaeetus</i>	I	
	<i>Pelagicus</i>		
拟兀鹫	<i>Pseudogyps</i>	I	
	<i>Bengalensis</i>		
胡兀鹫	<i>Gypaetus barbatus</i>	I	
其它鹰类	(Accipitridae)		II
隼科(所有种)	Falconidae		II
鸡形目	GALLIFORMES		
松鸡科	Tetraonidae		
细嘴松鸡	<i>Tetrao parvirostris</i>	I	
黑琴鸡	<i>Lyrurus tetrix</i>		II
柳雷鸟	<i>Lagopus lagopus</i>		II
岩雷鸟	<i>Lagopus mutus</i>		II
镰翅鸡	<i>Falcipennis</i>		II
	<i>Falcipennis</i>		
花尾榛鸡	<i>Tetrastes bonasia</i>		II

斑尾榛鸡	<i>Tetrastes sewerzowi</i>	I	
雉科	Phasianidae		
雪鸡(所有种)	<i>Tetraogallus</i> spp.		II
雉鹑	<i>Tetraophasis</i>	I	
	<i>Obscurus</i>		
四川山鹧鸪	<i>Arborophila</i>	I	
	<i>Rufipectus</i>		
海南山鹧鸪	<i>Arborophila ardens</i>	I	
血雉	<i>Ithaginis cruentus</i>		II
黑头角雉	<i>Tragopan</i>	I	
	<i>Melanocephalus</i>		
红胸角雉	<i>Tragopan satyra</i>	I	
灰腹角雉	<i>Tragopan blythii</i>	I	
红腹角雉	<i>Tragopan</i>		II
	<i>Temminckii</i>		
黄腹角雉	<i>Tragopan caboti</i>	I	
虹雉(所有种)	<i>Lophophorus</i> spp.	I	
藏马鸡	<i>Crossoptilon</i>		II
蓝马鸡	<i>Crossoptilon</i>		
褐马鸡	<i>Crossoptilon</i>	I	
	<i>auritum crossoptilon</i>		
	<i>mantchuricum</i>		
黑鹇	<i>Lophura</i>		II
	<i>Leucomelana</i>		
白鹇	<i>Lophura</i>		II
	<i>Nycthemera</i>		II
蓝鹇	<i>Lophura swinhoii</i>	I	
原鸡	<i>Gallus gallus</i>		II
勺鸡	<i>Pucrasia</i>		II
	<i>Macrolopha</i>		
黑颈长尾雉	<i>Syrmaticus humiae</i>	I	
白冠长尾雉	<i>Syrmaticus reevesii</i>		II
白颈长尾雉	<i>Syrmaticus ellioti</i>	I	
黑长尾雉	<i>Syrmaticus Mikado</i>	I	
锦鸡(所有种)	<i>Chrysolophus</i> spp.		II
孔雀雉	<i>Polyplectron</i>	I	
	<i>Bicalcaratum</i>		
绿孔雀	<i>Pavo muticus</i>	I	
鹤形目	GRUIFORMES		
鹤科	Gruidac		
灰鹤	<i>Grus grus</i>		II
黑颈鹤	<i>Grus nigricollis</i>	I	
白头鹤	<i>Grus monacha</i>	I	
沙丘鹤	<i>Grus canadensis</i>		II

丹顶鹤	<i>Grus japonensis</i>	I	
白枕鹤	<i>Grus uipio</i>		II
白鹤	<i>Grus leucogeranus</i>	I	
赤颈鹤	<i>Grus antigone</i>	I	
蓑羽鹤	<i>Anthropoides virgo</i>		II
秧鸡科	Rallidae		
长脚秧鸡	<i>Vrex crex</i>		II
姬田鸡	<i>Porzana parva</i>		II
棕背田鸡	<i>Porzana bicolor</i>		II
花田鸡	<i>Coturnicops noveboracensis</i>		
鸨科	Otiade		
鸨(所有种)	<i>Otis spp.</i>	I	
鸽形目	CHARADRIIFORMES		
雉鸨科	Jacanidae		
铜翅水雉	<i>Metopidius indicus</i>		II
鹬科	Scolopacidae		
小杓鹬	<i>Numenius borealis</i>		II
小青脚鹬	<i>Tringa guttifer</i>		II
燕鸨科	Glareolidae		
灰燕鸨	<i>Glareola lactea</i>		II
鸥形目	LARIFORMEA		
鸥科	Laridae		
遗鸥	<i>Larus relictus</i>	I	
小鸥	<i>Larus minutus</i>		II
黑浮鸥	<i>Chlidonias niger</i>		II
黄嘴河燕鸥	<i>Sterna aurantia</i>		II
黑嘴端凤头燕鸥	<i>Thalasseus zimmermanni</i>		II
鸽形目	COLUMBIFORMES		
沙鸡科	Pteroclididae		
黑腹沙鸡	<i>Pterocles orientalis</i>		II
鸠鸽科	Columbidae		
绿鸠(所有种)	<i>Treron spp.</i>		II
黑颈果鸠	<i>Ptilinopus leclancheri</i>		II
皇鸠(所有种)	<i>Ducula spp.</i>		II
斑尾林鸽	<i>Columba palumbus</i>		II
鹁鸠(所有种)	<i>Macropygia spp.</i>		II
鸚形目	PSITTACIFORMES		
鸚鵡科(所有种)	Psittacidae		II
鹃形目	CUCULIFORMES		
杜鹃科	Cuculidae		
鸦鹃(所有种)	<i>Centropus spp.</i>		II

鸮形目(所有种)	STRIGIFORMES		II
雨燕目 雨燕科 灰喉针尾雨燕  凤头雨燕科 凤头雨燕	APODIFORMES Apodidae Hirundapus Cochinchinensis Hemiprocnisae Hemiprocne longipennis		II
咬鹃目 咬鹃科 橙胸咬鹃	TROGONIFORMES Trogonidae Harpactes oreskios		II
佛法僧目 翠鸟科 蓝耳翠鸟 鹳嘴翠鸟  蜂虎科 黑胸蜂虎 绿喉蜂虎 犀鸟科(所有种)	CORACIIFORMES Alcedinidae Alcedo meninting Pelargopsis Capensis Meropidae Merops leschenaulti Merops orientalis Bucerotidae		II II  II II II
鸢形目 啄木鸟科 白腹黑啄木鸟	PICIFORMES Picidae Dryocopus javensis		II
雀形目 阔嘴鸟科(所有种) 八鸟鸫科(所有种)	PASSERIFORMES Eurylaimidae Pitidae		II II
爬行纲 REPTILIA			
龟鳖目 龟科 * 地龟  * 三线闭壳龟 * 云南闭壳龟 陆龟科 四爪陆龟 凹爪陆龟 海龟科 * 蠓 龟 * 绿海龟 * 玳瑁  * 太平洋丽龟	TESTUDIFORMES Emydidae Geoemyda spengleri Cuora trifasciata Cuora yunnanensis Testudinidae Testudo horsfieldi Manouria impressa Cheloniidae Carctta caretta Chclonia mydas Erctmochelys Imbricata  Lcdidochelys Olivaces	I	II II II  II II II  II

棱皮龟科 * 棱皮龟  鳖科 * 鼋  * 山瑞鳖	Dermochelyidae Dermochelys Coriacea Trionychidae Pelochelys bibroni Trionyx  steindachneri	I	II
蜥蜴目 壁虎科 大壁虎 鳄蜥科 鳄蜥  巨蜥科 巨蜥	LACERTIFORMES Gekkonidae Gekko gecko Shinisauridae Shinisaurus Crocodilurus Varanidae Varanus salvator	I	II
蛇目 蟒科 蟒	SERPENTIFORMES Boidae Python molurus	I	
鳄目 鼍科 扬子鳄	CROCODILIFORMES Alligatoridae Alligator sinensis	I	
两栖纲 AMPHIBIA			
有尾目 隐鳃鲵科 * 大鲵 * 蝾螈科 * 细痣疣螈  * 镇海疣螈  * 贵州疣螈  * 大凉疣螈  * 红瘰疣螈  无尾目 蛙科 虎纹蛙	CAUDATA Cryptobranchidae Andrias davidianus Salamandridae Tylotriton Asperrimus Tylotriton Chinhaiensis Tylotriton Kweichowensis Tylotriton Taliangensis Tylotriton Verrucosus  ANURA Ranidae Rana tigrina		II
鱼纲 PLSCES			
鲈形目 石首鱼科 * 黄唇鱼	PERCIFORMES Sciaenidae Bahabe flavolabiata		II

杜父鱼科 * 松江鲈鱼	Cottidae Trachidermus fasciatus		II
海龙鱼目 海龙鱼科 * 克氏海马鱼	SYNGNATHIFORMES Syngnathidae Hippocampus kelloggi		II
鲤形目 胭脂鱼科 * 胭脂鱼  鲤科 * 唐鱼  * 大头鲤 * 金钱鲃  * 新疆大头鱼 * 大理袞腹鱼	CYPRINIFORMES Catostomidae Myxocyprinus Asiaticus Cyprinidae Tanichthys Albonubes Cyprius pellegrini Sinocyclocheilus grahami grahami Aspiorhynchus laticeps Schizothorax taliensis	I	II  II  II II  II
鳗鲡目 鳗鲡科 * 花鳗鲡	ANGUILLIFORMES Anguillidae Anguilla marmorata		II
鲑形目 鲑科 * 川陕哲罗鲑 * 秦岭细鳞鲑	SALMONIFORMES Salmonidae Hucho bleekeri Brachymystax lenok tsinlingensis		II II
鲟形目 鲟科 * 中华鲟 * 达氏鲟  匙吻鲟科 * 白鲟	ACIPENSERIFORMES Acipenseridae Acipenser sinensis Acipenser Dabryanus Polyodontidae Psephurus gladius	I I  I	
文昌鱼纲 APPENDICULARIA			
文昌鱼目 文昌鱼科 * 文昌鱼	AMPHIOXIFORMES Branchiostomatidae Branchiostoma belcheri		II
珊瑚纲 ANTHOZOA			
柳珊瑚目 红珊瑚科	GORGONACEA Coralliidae		

* 红珊瑚	Corallium spp	I	
腹足纲 GASTROPODA			
中腹足目	MESOGASTROPODA		
宝贝科	Cypraeidae		
* 虎斑宝贝	Cypraea tigris		II
冠螺科	Cassididae		
* 寇螺	Cassis cornuta		II
瓣鳃纲 LAMELLIBRANCHIA			
异柱目	ANISOMYARIA		
珍珠贝科	Pteriidae		
* 大珠母贝	Pinctada maxima		II
真瓣鳃目	EULAMELLIBRANCHIA		
砗磲科	Tridacnidae		
* 库氏砗磲	Tridacna cookiana	I	
蚌科	Unionidae		
* 佛耳丽蚌	Lamprotula Mansuyi		II
头足纲 CEPHALOPODA			
四鳃目	TETRABRANCHIA		
鹦鹉螺科	Nautilidae	I	
* 鹦鹉螺	Nautilus pompilius		
昆虫纲 INSECTA			
双尾目	DIPLURA		
铗科	Japygidae		
伟铗	Atlasjapyx atlas		II
蜻蜓目	ODONATA		
箭蜓科	Gomphiade		
尖板曦箭蜓	Heliogomphus		II
	Retroflexus		
宽纹北箭蜓	Ophiogomphus spinicorne		II
缺翅目缺翅虫科	ZORAPTERA		
中华缺翅虫	Zorotypidae		
	Zorotypus sinensis		II
墨脱缺翅虫	Zorotypus medoensis		II
蛩蠊目	GRYLLOBLATTODEA		
蛩蠊科	Grylloblattidae		
	Galloisiana		
中华蛩蠊	sinensis	I	
鞘翅目	COLEOPTERA		
步甲科	Carabidae		
拉步甲	Carabus (Coptolabrus)		

硕步甲	Iafossei Carabus (Apotopterus) davidi		II
臂金龟科	Euchiridae		II
彩臂金龟(所有种)	Cheirotonus spp		II
犀金龟科	Dynastidae		II
叉犀金龟	Allomyrina davidis		II
鳞翅目	LEPIDOPTERA		
凤蝶科	Papilionidae		
金班喙凤蝶	Teinopalpus Aureus	I	
双尾褐凤蝶	Bhutanitis mansfieldi		II
三尾褐凤蝶	Bhutanitts thaidina Dongchuanensis		II
中华虎凤蝶	Luchdorfina chinensis huashancensis		II
绢蝶科	Parnassidae		
阿波罗绢蝶	Parnassius apollo		II
肠鳃纲 ENTEROPNEUSTA			
柱头虫科	Balanoglossidae		
* 多鳃孔舌形虫	Glossobalanus Polybranchioporus	I	
玉钩虫科	Harrimaniidae		
* 黄岛长吻虫	Saccoglossus hwangtauensis	I	

Note: Fishing agencies are responsible for the protection of Wildlife with “\*”, others are under the jurisdiction of Forestry agencies.

**Attached Table 2 Guangdong Key Terrestrial Wildlife Protection List (First Series)**

(Approved by Guangdong Provincial Government in 2001)

兽纲 MAMMALIA	
Chinese Name	Scientific Name
食肉目	CARNIVORIA
犬科	Canidae
狼	Canis lupus
灵猫科	Viverridae
椰子狸	Paradoxurus hermaphroditus
红颊蒙	Herpestes javanicus
食蟹蒙	Herpestes urva

猫科	Felidae
豹猫	Felis bengalensis
啮齿目	RODENTLA
鼯鼠科	Petauristidae
棕鼯鼠	Petaurista petaurista
豪猪科	Hystricidae
豪猪	Hystrix hodgsoni
<b>鸟纲 AVES</b>	
潜鸟目	GAVIIFORMES
潜鸟科	Gaviidae
红喉潜鸟	Cavia stellata
<b>鸕鷀目</b>	<b>PODICIPEDIFORMES</b>
鸕鷀科	Podicipedidae
凤头鸕鷀	Podiceps cristatus
<b>鸕形目</b>	<b>PROCELLARIIFORMES</b>
海燕科	Hydrobatidae
黑叉尾海燕	Oceanodroma monorhis
<b>雁形目</b>	<b>ANSERIFORMES</b>
鸭科	Anatidae
鸿雁	Anser cygnoides
豆雁	Anser fabalis
灰雁	Anser anser
小白额雁	Anser erythropus
斑头秋沙鸭	Mergus albellus
红胸秋沙鸭	Mergus serrator
普通秋沙鸭	Mergus merganser
<b>鸡形目</b>	<b>GALLIFORMES</b>
雉科	Phasianidae
白眉山鹧鸪	Arborophila gingica
<b>鹤形目</b>	<b>GRUIFORMES</b>
秧鸡科	Rallidae
紫水鸡	Porphyrio porhyrio
董鸡	Gallicrex cinerea
黑水鸡	Gallinula chloropus
<b>鸻形目</b>	<b>CHARADRIIFORMES</b>
蛎鹬科	Haematopodidae

蛎鹬	<i>Haematopus ostralegus</i>
鹬科	Scolopacidae
中杓鹬	<i>Numenius phaeopus</i>
反嘴鹬科	Recurvirostridae
黑翅长脚鹬	<i>Himantopus himantopus</i>
反嘴鹬	<i>Recurvirostra avosetta</i>
<b>鸥形目(所有种)</b>	<b>LARIFORMES</b>
<b>鸛形目</b>	<b>CUCULIFORMES</b>
杜鹃科	Cuculidae
棕腹杜鹃	<i>Cuculus fugax</i>
<b>雀形目</b>	<b>PASSERIFORMES</b>
鹛科	Muscicapidae
紫寿带	<i>Terpsiphone atrocaudata</i>
红嘴相思鸟	<i>Leiothrix lutea</i>
银耳相思鸟	<i>Leiothrix argenteauris</i>
雀科	Fringillidae
黑头蜡嘴雀	<i>Eophona personata</i>
黑尾蜡嘴雀	<i>Eophona migratoria</i>
黄胸巫	<i>Emberiza aureola</i>
<b>爬行纲 REPTILIA</b>	
<b>龟鳖目</b>	<b>TESTUDOFORMES</b>
平胸龟科	Platystemidae
平胸龟	<i>Platysternon megacephalum</i>
淡水龟科	Bataguridae
黄缘盒龟	<i>Cistoclemmys flavomarginata</i>
黄额盒龟	<i>Cistoclemmys galbinifrons</i>
锯缘摄龟	<i>Pyxidea mouhotii</i>
<b>有鳞目</b>	<b>SQUAMATA</b>
鬣蜥科	Agamidae
长鬣蜥	<i>Physignathus cocincinus</i>
<b>两栖纲 AMPHIBIA</b>	
<b>无尾目</b>	<b>SALIENTIA</b>

蛙科	Ranidae
黑斑蛙	Rana nigromaculata
棘胸蛙	Paa spinosa
沼蛙	Rana guentheri

**Attached Table3 Guangdong Key Aquatic Wildlife Protection List (First Series)**

(Approved by Guangdong Provincial Government in 2001)

Chinese Name	Scientific Name
<b>双壳纲 BIVALVIA</b>	
<b>珍珠贝目</b>	<b>PTERIOIDA</b>
珍珠贝科	Pteriidae
珠母贝	<i>Pinctada margaritifera</i> (Linnaeus)
<b>甲壳纲 CRUSTACEA</b>	
<b>十足目</b>	<b>DECAPODA</b>
龙虾科	Palinuridae
锦绣龙虾	<i>Panulirus orinatus</i> (Fabricius)
中国龙虾	<i>Panulirus stimpsoni</i> (Holthuis)
<b>肢口纲 MEROSTOMATA</b>	
<b>剑尾目</b>	<b>XIPHOSURA</b>
鲎科	Tachypleidae
中国鲎	<i>Tachypleus tridentatus</i> (Leach)
南方鲎	<i>Tachypleus gigas</i> (Müller)
圆尾鲎	<i>Carcinoscopius rotundicauda</i> (Latreille)
<b>软骨鱼纲 CHONDRICHTHYES</b>	
<b>须鲨目</b>	<b>ORECTOLOBIFORMES</b>
鲸鲨科	Rhincodontidae
鲸鲨	<i>Rhincodon typus</i> Smith
<b>鲭鲨目</b>	<b>ISURIFORMES</b>
姥鲨科	Cetorhinidae
姥鲨	<i>Cetorhinus maximus</i> (Gunner)
<b>硬骨鱼纲 OSTEICHTHYES</b>	
<b>鲈形目</b>	<b>PERCIFORMES</b>
鲈科	Serranidae
宽额鲈	<i>Promicrops lanceolatus</i> (Eloch)
驼背鲈	<i>Cromileptes altivelis</i> (Cuvier et Valenciennes)
隆头鱼科	Labridae
波纹唇鱼	<i>Cheilinus undulatus</i> Rüppell
<b>鲉形目</b>	<b>SILURIFORMES</b>
科	Panfasidae

半棱华	<i>Sinopangasius semicultratus</i> Chang et Wu
<b>鲱形目</b>	<b>CLUPEIFORMES</b>
鲱科	Clupeidae
鲳鱼	<i>Macrura reevesi</i> (Richardson)
<b>刺鱼目</b>	<b>GASTEROSTEIFORMES</b>
海龙科	Syngnathidae
刁海龙	<i>Solegnathus hardwicki</i> (Gray)
刺海马	<i>Hippocampus Histris</i> Kaup
管海马	<i>Hippocampus kuda</i> Bleeker
日本海马	<i>Hippocampus japonicus</i> Kaup
斑海马	<i>Hippocampus trimaculatus</i> Leach
<b>爬行纲 REPTILIA</b>	
<b>龟鳖目</b>	<b>TESTUDIFORMES</b>
淡水龟科	Bataguridae
闭壳龟属(除三线闭壳龟、云南闭壳龟外所有种)	Cuora spp.
眼斑水龟属(所有种)	Sacalia spp.
拟水龟属(所有种)	Mauremys spp.

## **Section 2**

**Report on Institutions, Policies, and Conflict in Highland Aquatic Conservation  
in the Northern and Central Vietnam.**

**D5.1**

**Report on**

**Report on institutions, policy and conflict in highland Aquatic  
conservation in the Northern and Central of Vietnam**

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## List of Abbreviations

ARDO	-	Agriculture and Rural Development Office, under the DPC
CPV	-	The Communist Party of Vietnam
CPC	-	Commune Peoples Committee
CSO	-	Civil society organisation
DONRE	-	Department of Natural resources and Environment (provincial)
DPC	-	District People's Committee
EIA	-	Environmental Impact Assessment
EPA	-	Environmental Protection Agency under DONRE
FF	-	Fatherland Front
FU	-	Farmers' Union
GOV	-	Government of the Socialist Republic of Vietnam
MARD	-	Ministry of Agriculture and Rural Development
MO	-	Mass Organisation
MOIT	-	Ministry of Industry and Trade
MONRE	-	Ministry of Natural Resources and Environment
MPI	-	Ministry of Planning and Investment
NA	-	National Assembly
NTP	-	National Target Program
NREO	-	Natural Resource and Environment Office, under the DPC
PPC	-	Provincial People's Committee
SEDP	-	Socio-Economic Development Plan
WU	-	Women's Union

## Executive summary

**This report presents the research findings** from Vietnam under work package 5: Stakeholders, institutions & markets of the project: “Highland aquatic resources conservation and sustainable development” (HighARCS). The study focuses on building an understanding of the policies and institutional framework regulating and managing the aquatic resources in the two study sites Yen Phu District, Son La Province, and Dakrong District, Quang Tri Provinces, and the market pressures and conflicts between users and uses, based on this a set of recommendations were developed to serve as an input for the action planning stage later in the HighARCS project. The study’s methodology combined a desk study of legislation and policies, secondary data with a set of primary data collected in the two study sites: informal interview with local authorities, local households, other local stakeholders, and a market survey.

**The report describes Vietnam as a one party-state** consisting of three parties: the Communist Party of Vietnam, the Government, and the National Assembly, and the political and administrative system as a complex top-down party-state structure with four levels of state apparatus (central, provincial, district, and commune level). The Government supervises the activities of the Provincial People’s Committees (PPC), however devolution of decision-making power to the PPCs have increased over the past two decades. This means that in the present party-state structure, the Provincial People’s Committee has a high level of influence on decisions about development and environmental policies and how resource management rules are made and implemented in practise.

**The national framework of legislations regulating biodiversity conservation, environmental protection, and conservation and use of aquatic resources** is comprehensive, however that there are a range of limitations in this framework in terms of inconsistencies/overlaps between different legislations and policies and related thereto an overlap between mandates between the institutions protecting and the institutions managing the aquatic resources (SEMLA 2009). There is moreover a lack of detailed guidelines for implementation laws and policies at sub-national levels, which combined with a weak capacity contribute to a weak implementation in practice (O’Rourke 2002). A general limitation in the policy framework is the lack of the specifications for involvement of local communities in conservation and use of aquatic resources, e.g. co-management (Swan 2010).

As part of building a basis for analysing the stakeholders’ interests in aquatic resources the study analysed the **market network of aquatic products**, using the aquatic catch and markets in Phu Yen District, Son La Province as a case. The market analysis revealed that for poor and less well off fishermen the main aquatic product is fish. Small fish are sold in village, village market, or as dried fish in large volumes or used for own consumption, while bigger and special fish are sold to local collectors. The market analysis revealed that poor and less well off fishermen profit less from the catch and sale of fish and shrimp compared to the local retailers.

**A range of stakeholders** are involved in biodiversity and conservation and use of aquatic resources and there are presently **many development pressures on and threats to biodiversity and aquatic resources** as follows (Chapter 4):

**Hydropower:** There is extensive hydropower development in Phu Yen and Dakrong Districts, existing and planned, this is changing the flows in the streams and rivers and causing sedimentation and erosion. No reports exist on the impacts of hydropower on biodiversity in Dakrong. In Phu Yen,

EIA has been conducted prior to construction of hydropower. However there has been no research on the changes in aquatic resources after the construction and operation.

**Mineral exploitation:** Development of mining and processing activities are given high priority in the SEDPs of both Dakrong and Phu Yen district. Extensive gold mining is already taking place in Dakrong causing soil erosion and water pollutions in streams and rivers. Given the plans and present poor regulation of mining activities, it is expected that mineral extraction will have devastating impacts on biodiversity and aquatic resources in the future.

**Agriculture activities:** Streams and rivers in Phu Yen District are being polluted by chemicals and pesticides high slope agriculture, the negative impacts on fish stock and biodiversity is expected to increase in the future as the District SEDP encourages more intensive agriculture. Meanwhile, the plan in Dakrong District is to develop concentrated agri-forest areas, which should enable biodiversity conservation while also developing the agricultural activities.

**Fishery and aquaculture:** The local Governments view Aquaculture and fisheries are viewed as important (alternative) livelihood activities for its (poor) local people, hence these activities are encouraged and promoted. Aquaculture activities/outputs are planned to be doubled and tripled within the next 5 to 10 years and with introduction of new species this is expected to impact the biodiversity and natural resources conservation. Present fishing practices are unsustainable and illegal, however regulations and penalties are not enforced.

**Industrial development:** Both Districts have extensive plans for industrial development, which could have severe negative impacts on the stream, rivers and aquatic resources as the Districts are presently not equipped to conduct water quality checks and reports on polluting factories, nor do they have environmental management plans in place.

With regard to the **implementation of legislations and policies** in Son La and Quang Tri Provinces regarding the conservation and use of aquatic resources, the study found many weaknesses in the implementation at provincial, district, and commune levels. The challenges vary between the provinces and the different levels in the administration (Chapter 5).

The study derived at **nine key recommendations** related to policies, institutions, and implementation in practice, including: i) Integration of biodiversity conservation into development, ii) Addressing the issue of overlapping institutional mandates, iii) Enhancing management and technical capacity of technical units at all sub-national levels, iv) Strengthening enforcement of regulations, v) Enhancing community participation for improved management and use of aquatic resources, vi) Balancing poverty reduction/alternative livelihood creation and aquatic resource conservation, vii) Building a shared understanding of aquatic resources and the extent of fishing in Dakrong District, viii) Improving wastewater monitoring in Phu Yen District, ix) Addressing the negative impacts of mining (Chapter 6).

# **1. Introduction**

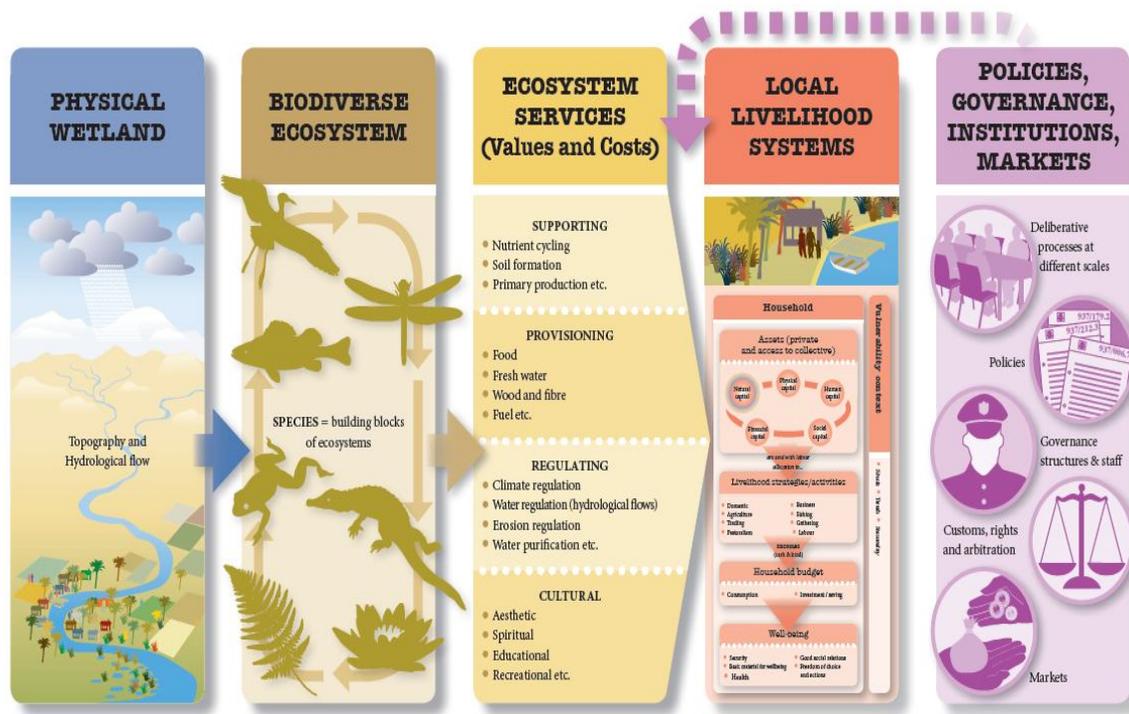
## **1.1. The HighARCS project**

The project “Highland aquatic resources conservation and sustainable development” (HighARCS) has been funded by the European Commission. The project is carried out from 1/2009 to 12/2012 with overall coordinated by the University of Essex and the involvement of 10 partners from Europe and Asia.

The HighARCS project aims to provide full consideration for biodiversity conservation, sustaining ecosystem services and wise-use of highland aquatic resources within a development context. The project comprises a set of nine work packages (WP): Situation Appraisal (WP1), Dissemination, monitoring & evaluation (WP2), Ecosystem services & biodiversity values (WP3), Highland aquatic resources & livelihoods (WP4), Stakeholders, institutions & markets (WP5), Conserving ecosystems services & biodiversity values (WP6), Sustainable highland aquatic resources development & livelihoods (WP7), Policy development to support conservation & wise-use (WP8) and Project management (WP9). The nine work packages all contribute to a rapid interdisciplinary situational analysis, an assessment of ecosystems, livelihoods dependent on highland aquatic resources, and associated social and institutional issues. Based on these analyses Conservation Action Plans, Livelihoods Action Plans and Policy Action Plans are developed and implemented. The project covers five study sites in Asia: Guangdong, China; Utrakhand and West Bengal, India; and Son La Province and Quang Tri Province, Vietnam.

## **1.2. Stakeholders, institutions & markets (work package 5)**

According to the IUCN toolkit adopted for the HighARCS project, policies, governance, institutions and markets are a group of key factors, which need to be understood in order to understand the dynamics of the overall management challenge. The interlinked aspects of wetland landscape are illustrated in Figure 1. In this figure, policies, governance, institutions and market are some of the important factors in between biodiversity, ecosystem services, livelihood and physical wetland.



**Figure 1: Interlinked aspects of a wetland landscape (Springate-Baginski et al. 2009)**

The WP5 research aims to contribute more sustainable management practices of aquatic resources by analysing the roles of policies, institutions, and conflicts of interest between different users and uses of aquatic resources in Vietnam. Aquatic resources are defined as having partial or entire life cycle underwater. Conservation of biodiversity is understood as protection of the aquatic species avoiding the adverse effects from many different factors such as people, weather and climate.

This research is structured around answering the following four key questions:

1. What are the structure and prominent modes of operation of the political and administrative systems in Vietnam, and how do they influence the way in which decisions about development and environmental policies and resource management rules are made and being implemented?
2. In each selected field site, what are the existing institutions and legislations, which mediate access to aquatic resources at multiple scales and levels of government? How are these laws and policies enforced and implemented, and how are decision-making processes taking place at this level?
3. What are stakeholder interests, dilemmas and conflicts of sustainable management of aquatic resources in the study sites? How do conflicts evolve (this also needs to be specified throughout the report) and relate to the enforcement of existing policies and legislations by the relevant institutions and through the existing decision-making processes?
4. What policies and institutional actions are needed to improve aquatic resource management practices and resolve identified conflicts between multiple stakeholders, in order to ensure sustainable resource management whilst maximizing local income generating activities? Who should be responsible for these actions?

### **1.3. Focus and methodology of this study**

This study is one of two deliverables of WP5, it focuses on building an understanding of the policies and institutional framework regulating and managing the aquatic resources in the two study sites (Son La and Quang Tri Provinces) and the market pressures and conflicts between users and uses. Building such an understanding is very relevant in the case of Vietnam where many policies and regulations to protect the environment and biodiversity have been introduced and new institutions established in the past decades, but other policies and institutions influence uses and pressures on aquatic resources in Vietnam, however, the natural resource base and biodiversity in Vietnam are decreasing (VDR 2011). On this basis of the analysis of this study a set of recommendations is developed, which will serve as an input for the development of action plans for sustained provision of ecosystem services, in view of improved resource use, tackling user conflicts and conserving aquatic resources.

To be able to analyse the existing policies and institutions on one hand and the practice of management and uses of aquatic resources the study's methodology combines a desk study of legislation and policies, secondary data (reports, and articles, etc.) with a set of primary data collected in the two study sites: informal interview with local authorities, local households, other local stakeholders, and a market survey.

#### **1.3.1. Data compilation**

##### ***Secondary data collection***

This report uses secondary materials collected from government, province, district and commune levels, and includes law, legislation, decrees, reports on function and tasks of different institutions, biodiversity and natural resources protection strategies. It also refers to state, ministries and institutions official websites.

##### ***Informal interviews***

Primary data was collected in both provinces through informal interviews with key civil servants from the People's Committee's at the province, district and commune levels, and from the agricultural and rural development and environmental departments and offices province and district levels respectively. Furthermore, interviews were conducted with the persons in charge of agriculture, aquaculture and/or environment in the communes and with the village heads. Due to the sensitive nature of many of the issues related to this study, all interviews were conducted in confidentiality, and hence in the interviews are only referenced with the date and not the name, to ensure that comments are kept confidential.

##### ***Local market survey***

Another set of primary data was collected through a local market survey, which aimed to build an understanding of the market chain of aquatic product. This was done by conducting informant interviews with fishermen, middlemen and traders at local market and inside the village where aquatic products were sold.

## **The legislative, policy, and institutional framework governing aquatic resources**

A number of legislations, policies and institutions, national, provincial, district, and communal, formal and informal, govern the aquatic resources use in the two project sites. This chapter presents the key legislations, policies, and institutions in this framework with regard to governance of aquatic resources and moreover the poverty reduction policies in the two project provinces. The chapter contributes to the basis for analysing the stakeholder's interests, dilemmas, and conflicts regarding aquatic resources and recommendations for advancing more sustainable management in the project sites.

### **1.4. The political and administrative organisation of the Party-State**

The Socialist Republic of Vietnam is a one party-state consisting of three parties: the Communist Party of Vietnam, the Government, and the National Assembly. The party-state structure is very complex, with the four levels of state apparatus (central, provincial, district, and commune level), including the National Assembly and the Government at central level, and for the two latter respectively, the People's Councils and People's Committee at three sub national levels. Figure 2 provides an overview of the party-state structure and the government framework for environmental management and biodiversity conservations.

The Vietnamese Communist Party (VCP) directs the country's political and strategic orientation. This means that the VCP guides the legislative bodies at national level, the National Assembly (NA), and the People's Councils sub-national levels (provincial, district, and commune levels) both through guiding resolutions and the majority of NA and People's Councils members being members of the VCP (Le Thi Quy 2001). The VCP also guides the executive bodies, the Government at national level and the People's Committees at sub-national levels, through policies and Party committees and members working in these bodies. Finally the VCP is also exerts its leadership through the mass organisations, comprising of Vietnam Fatherland Front (VFF), Women's Union, (WU) Farmers' Union (FU), General Federation of Labour, War Veterans Association, and the Ho Chi Minh Youth Union, however to a decreasing extent (Norlund 2007). The number of members of the five latter mass organisations was in 2006 around 32 million (excluding the VFF) (Norlund 2007). The Vietnam Fatherland Front (VFF) is the umbrella organisation of all mass organisations, such as the Farmers Union as well as of a range of other unions, associations, and other organisations (Doan 2010). All mass organisations have Historically mass organizations were established with the dual purpose of addressing the interests of the Vietnamese people and to link the people and the Party, bringing the policies of the Party and the Vietnamese Government into social life (Le Thi Quy, 2001).

The National Assembly (NA) is designated as the highest representative of the State and the people. It is the only organ with constitutional and legislative power; the NA puts forth five-year and annual law-framing programme and undertakes overall supervision of the observance of the laws it passes. Formally, the NA decides the basic domestic and foreign policies, the socio-economic tasks, national defence, and security issues, the major principles governing the State machinery, the social

relations and activities of citizens. Members of the NA are elected by local people every five years by secret ballot (Le Thi Quy 2001).

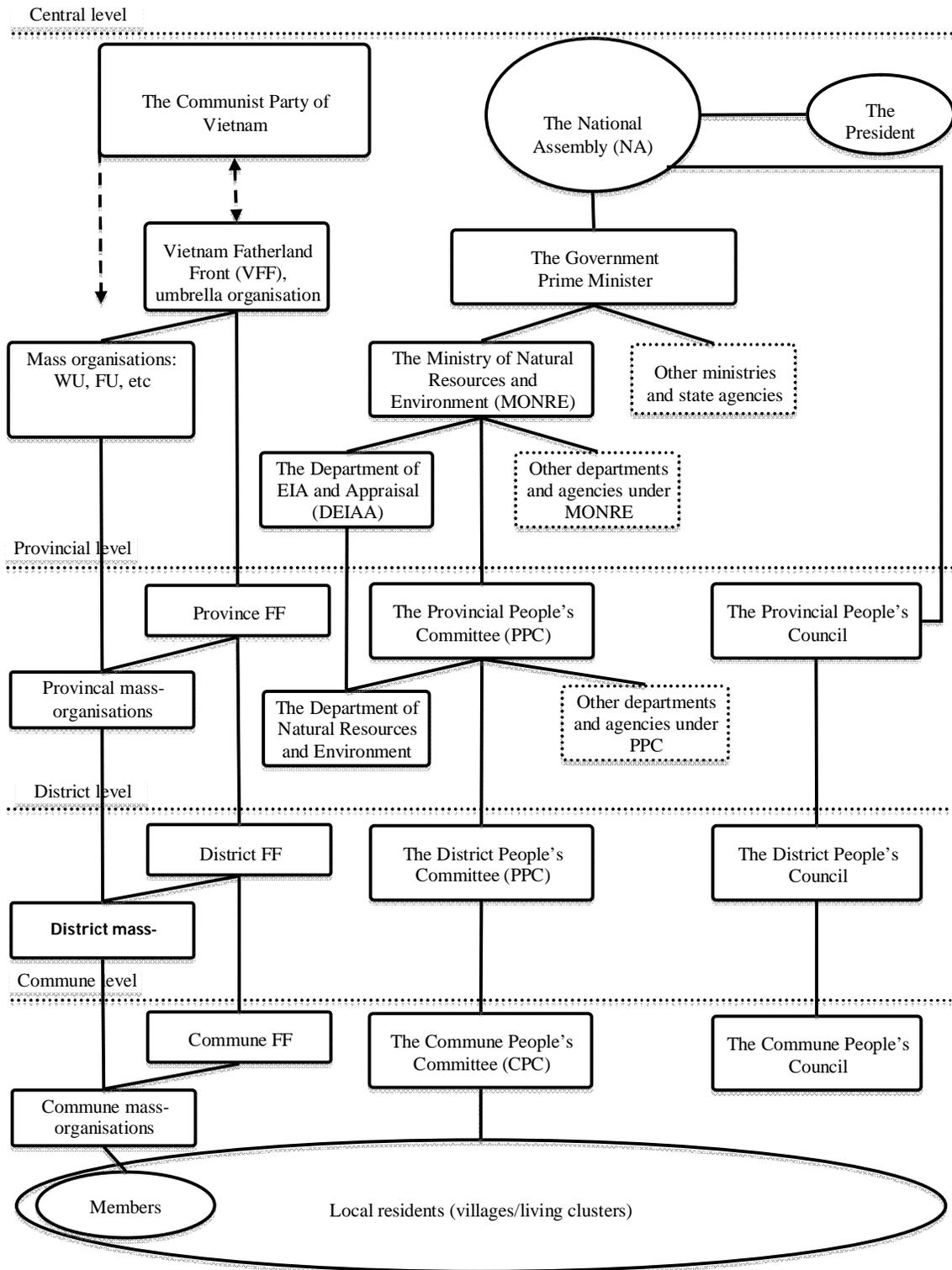


Figure 2: The Vietnamese Party-State's political and administrative system (based on Doan 2010)

The Government, chaired by the Prime Minister, is the executive organ of the State and is accountable to the NA, the Standing Committees of the NA, and the country's President. The President is the Head of the State and is responsible for internal management and external relations, while the Prime Minister leads the work of the Government and its members – the ministers, who are recommended by the Prime Minister and approved by the NA. Ministers are responsible for management of the fields they are in charge of, such as the Ministry of Natural Resources and Environment (MONRE), and are accountable to the Prime Minister and the NA. There are more than ten line ministries and central agencies dealing with natural resources and environment<sup>1</sup>.

The Government supervises the activities of the Provincial People's Committees<sup>2</sup>, however, since the Doi Moi reform in 1986 there has been an increasing devolution of decision-making power to the PPCs, firstly regarding economic sectors followed by increased autonomy to select investment projects and allocating budget resources, and later decisions regarding planning processes and land-use was considerably decentralised (VDR 2010). This trend continued in the second decade after Doi Moi when provinces were given a larger role with regard to budgeting and public investment and land use decisions. Most recently provinces have gained a say over human resources management decisions, and further decentralisation of public investment decisions (VDR 2010).

The People's Councils are elected by local people and are responsible to local people and higher State bodies, and the People's Council elects the People's Committee. In 2004, the People's Councils gained the power to issue legal documents deciding on socio-economic development plans in their respective localities (VDR 2010). The People's Committees (local Government) at all three sub-national levels are responsible for the daily administration and function as the People's Councils' executive body. The People's Committees are responsible for implementing the Constitution, laws and secondary legislations issued by higher state bodies as well as the decisions of People's Councils (Le Thi Quy 2001). In practice, the People's Committee often has a more imperative say in what is decided, however, in the case of some provinces the People's Council are gaining strength in their role in decision-making and in supervising the operation of the People's Committees (Doan 2010).

Likewise the Government at national, the People's Committees at all levels are supported by technical units, departments, divisions and responsible staff at each level. Provincial departments have dual responsibilities; they are accountable to line ministries for technical work, and to the provinces for plan implementation and administrative matters.

At the lowest level of the Government administrative system is the commune level, which in rural areas consists of villages and their surrounding areas. The Commune People's Committees assign village leaders that manage grassroots administration. In the minority ethnic areas, village administration is carried out by a dual system; the village leader and the village elder, or in some cases, a Village Elder Council, which traditionally is chosen by the community (Doan 2010).

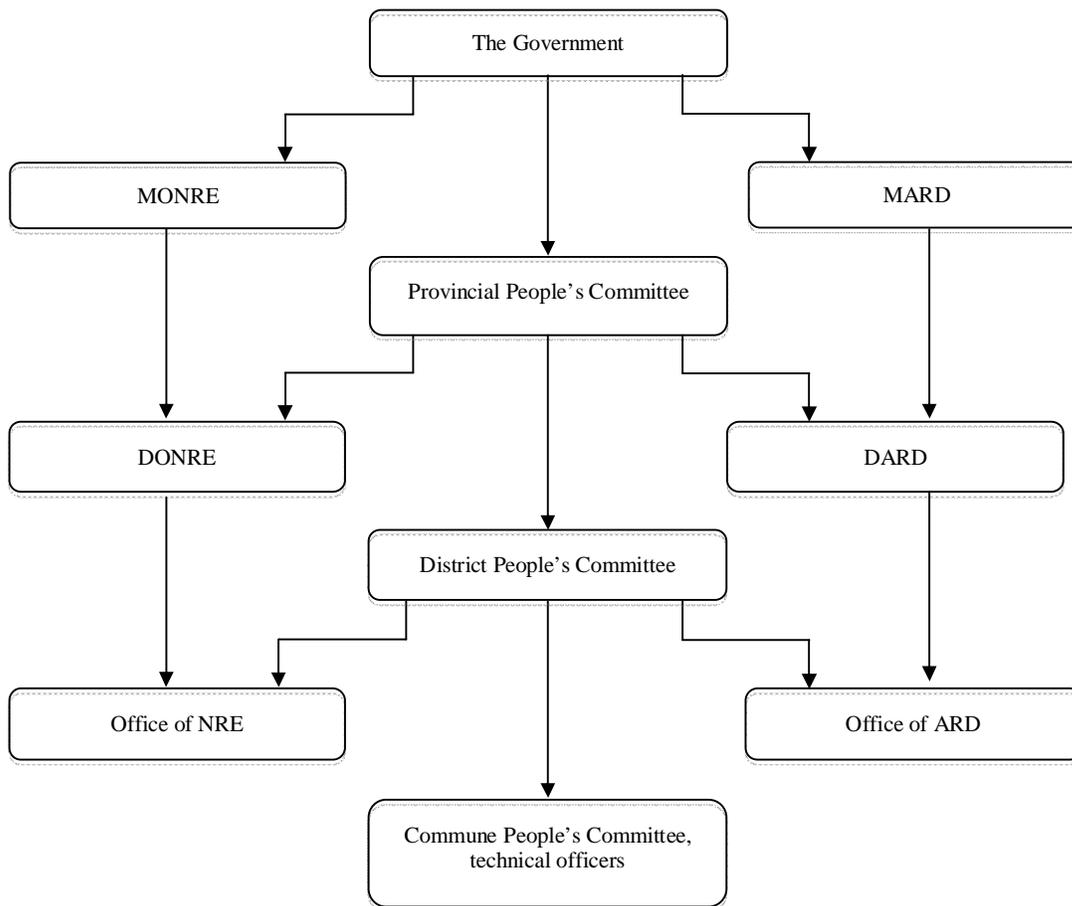
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<sup>1</sup> Key ministries include: the Ministry of Agriculture and Rural Development; Ministry of Industry and Trade; Ministry of Construction; Ministry of Health; Ministry of Transport; and Ministry of Education and Training.

<sup>2</sup> There are presently 63 provinces in Vietnam.

### 1.5. Institutions related to aquatic resources protection and management

The Biodiversity Law (2008) defines that the Government performs unified state management of biodiversity and mandates MONRE as the lead state agency for management of biodiversity (Art. 6). Other ministries, ministerial-level agencies and People’s Committees and departments also execute specific functions assigned by this Law and the by the Government. MONRE and MARD are two key ministries related to biodiversity and aquatic resources conservation: are MONRE and MARD. These ministries are, as mentioned in the previous section, accountable to the Government, for delivery on the functions assigned to these ministries by law and policies. The below figure provides an overview of the key institutions related to biodiversity and aquatic resources conservation and management at all four administrative levels:



**Figure 3: Key government institutions at all level involved in aquatic resources conservation and management**

The Ministry of Natural Resources and Environment (MONRE) contains both the Department of Environment and the Department of Biodiversity conservation and is directly responsible for environment and aquatic conservation, making plans on the use, overall management and protection for biodiversity. The department sets guidelines and make documentation to responsible departments in management of water resources and water quality at provincial level (<http://www.monre.gov.vn>).

The Ministry of Agriculture and Rural Development (MARD) guide and inspect provinces in the implementation of planning on exploitation, protection and development of fisheries resources, to set criteria for classification of species habitat conservation zones and aquatic nature reserves, guide the decentralization of the management of conservation zones of national and international importance (<http://www.agroviet.gov.vn>).

The Provincial People's Committee (PPC) is the highest administrative authority in a province under which departments are organized following a similar vertical structure to the central level. Each provincial department is responsible for state management on their respective issues. There are two main departments related to aquatic conservation; The Department of Natural Resources and Environment (DONRE) and the Department of Agriculture and Rural Development (DARD).

DONRE is a specialized agency of the Provincial People's Committee carrying out the functions of State management of land resources, water resources, mineral resources, environment, meteorology and hydrology, in the form of surveying and mapping out the province in accordance with the law (SEMLA 2009). DONRE works under the direction and management of the organization, staffing and work of the provincial People's Committee, as well as under the direction and inspection of professional services of the MONRE.

Within DARD lies the Aquaculture Department, is responsible for producing guidelines in aquatic conservation to all districts. The Aquaculture Department also distributes Government decisions, guiding circulars, and instructions related to aquaculture of to all districts. In the coastal provinces such as Quang Tri, DARD has the Department of Exploiting and Protection of Aquatic Resources (DEPAR). DEPAR of Quang Tri was established in 2009 based on the decision No 13/2009/QĐ-UBND dated 10th July 2009 of Quang Tri people committee (Quang Tri People's Committee 2009). It is responsible for performing state management of exploitation and protection of fisheries resources under the state management of the province; and for inspecting and supervising the implementation of fisheries laws at sea, rivers, lakes and other wetlands.

At district level, the Office of Natural Resources and Environment (ONRE) is the specialized body that provides support to District People's Committees on NRE issues (SEMLA 2009). This department is mainly responsible for land and water management issues. The Office of Agriculture and Rural Development (OARD) guides the district on aquatic conservation implementation. Both offices are responsible for distribution of Government decisions, guiding circulars, and instructions related to aquaculture of to all communes, however this function has shortcomings and there are many examples of documents not being transferred to the commune level (SEMLA 2009, Interview, Sep 2010).

The Commune People's Committee informs local people through meetings or local speakers on all documents received from the district. However, many communes are not focusing on this issue and there is no inspector network in aquatic conservation and the laws are not well implemented in local communities.

Given the setting on key government institutions related to biodiversity and aquatic resources protection and management, as described above, there is and overlap in responsibilities and management between the institutions involved (SEMLA 2009).

### **1.1.2. Institutions indirect related to aquatic resources**

#### ***Mass organisations related to aquatic resources management and use***

As mentioned in section 2.1, a number of mass organisations (MOs) exist in Vietnam (see Figure 2). The MOs were historically established with the dual purpose of addressing the interests of the Vietnamese people and to link the people and the Communist Party of Vietnam (CPV). However, the MOs are increasingly focusing more on addressing interests of its local constituency, particularly at the commune levels (Norlund 2007). The mandate and responsibilities of some of the MOs are related to aquatic resources management and use. This adds to the potential relevance to the management and use of aquatic resources in the project sites. Below it is described why the four mentioned MOs have relevance to aquatic resources management and use:

- The Farmer's Union: has a member base of farmers. At commune level in rural areas members most households are farmers therefore it is considered as large organisation. The members in Farmer's Union benefit from training courses on agriculture and help on business economics and share work experiences. Therefore Provincial and district farmers' associations have a role as leader to the commune Farmers associations.
- Women Union: is composed of women volunteering to conduct the WU's activities. The WU is organised from village/commune level and up to national level, and high proportion of women take part in the villages/commune level activities. The WU aim to help and build capacity for women on gender issues, birth control, household economic development, etc. For example, WU members establish credit/revolving funds to mobilise credit/loan for its members.
- The Ho Chi Minh Youth Union: is composed selected youth members (boys and girls from 15 years old and up). Recently, some of Youth Unions organise activities related to environmental sanitation such as village cleaning.
- The War Veterans Association: members include volunteer war veterans. Activities range from meetings on war memories to supporting economic development activities. THE WVA and its members are highly respected in society, and there are cases of WVA and its members having played important roles in protection of biodiversity and natural areas and resources (Interview, Sep 2011).

#### ***Citizen-led and informal institutions***

Research and analysis of the role of informal institutions in natural resources management in Vietnam has primarily been focused on informal institution defined as non-state entities (e.g. O'Rourke 2002, Vietnam Development Report 2011, Swan 2010, Well-Dang 2011), e.g. local formal/informal natural resource groups, while there has been limited research of the role of There informal institutions understood as social systems and structure, such as local customs, family traditions, religious beliefs etc. Hence, in this study, this study primarily focuses on informal institutions refers to citizen-led organisations and groups exist at commune/village level.

In general, many citizen-led organisations and groups exist at commune/village level in Vietnam, including production organisations and groups (cooperatives and collaborative groups) resource user groups (such as local fishery associations or fishing groups) and various interest groups (credit groups, people with disability groups, HIV/AIDS groups etc). These groups might be formal in the sense that they are recognised by a legislative document or registered with a Government agency or

informal groups that are voluntarily organised and regulated (function, membership, fee etc) (Doan 2010). Of these various citizen-led groups the production and resource organisations and groups are of particular relevance to how aquatic resources are conserved or used.

### **1.1.3. Legislations and policies on biodiversity, environment, and aquatic resources protection and management**

A comprehensive set of legislations (laws and secondary legal documents) regulates biodiversity conservation, environmental protection, and conservation and use of aquatic resources. The table below provides an overview of some of the key legislations.

**Table 1: Key legislations regarding biodiversity conservation, environmental protection, and aquatic resources conservation and use**

<b>Key legislations</b>	<b>Content</b>
<b>Laws</b>	
The Water Resources Law (1998)	Provisions for water resource protection and for the mandate and responsibilities of state agencies, and the rights and obligations of households and individuals with regard to water resources. This law and the following secondary legal documents represents a major step forward on water resources management, however there are some contradictions, gaps and overlaps between different legislations related to the protection and use of water resources and the organisation of water resource protection. Mandates MONRE as the state management agency in this field.
The Law on Environmental Protection, LEP (1994/2005)	Provisions for standards, and measures for environmental protection; and for the mandate and responsibilities of state agencies, and the rights and obligations of private companies, and organizations, households and individuals for environmental protection. Mandates MONRE as the state management agency in this field.
Law on Fishery (2004)	Provisions for regulation, protection, and development of aquatic resources. The Law regulates the protection and development of aquatic resources and mandate MARD as the state management agency in this field.
The Law on Biodiversity (2009)	Provisions for species diversity, ecosystem diversity, genetic diversity. With the promulgation of this law the regulations of biodiversity conservation, which had previously been scattered in many different legislations (including the laws above) became and protection became regulations, where pulled together into one single law. Mandates MONRE as the state management agency in this field.
<b>Key secondary legal documents</b>	
Decree 109/2003/ND-CP	Regulates conservation and sustainable development of wetlands
Decree No 27/2005/ND-CP	Provide detailed guidance on how to implement of the fisheries law. The decree contains 17 articles related to the exploitation and use of water resources for production, aquaculture and marine culture.
Decree 128/2005/ND-CP	Contains regulations on penalties for administrative violations in fisheries
Decree 120/2008/ND-CP	Provides and assign the framework and power for river basin management and plan
Decree 112/2008/ND-CP	Provides the framework for on management, protection, integrated exploitation the natural resources and environment of the irrigation and hydropower reservoirs.
Decree 80/2006/ND-CP	Provides detailed guidelines for implementation on the EIA framework (defined in the LEP 2005). Key specifications re: the timing of the EA in project planning cycle, defining the level of EA for various projects, specifies the responsibilities of state agencies at different levels in the appraisal and approval of EIAs

Protection of aquatic resources is reflected in many legal documents such as in the Law of Fisheries, Law of Environmental Protection and Law on Water Resources. Organizations and individuals have the right to exploit fisheries resources, but they must comply within the boundaries of these laws. Decree 128 stipulates that fines will be given to those whose actions affect the aquatic habitat when: discharging wastewater and oil to breeding and living areas of aquatic products, demolishing or constructing floating or underground structures that changes habitats of aquatic animals, releasing: waste, wash water or infected species into natural waters or aquaculture waters.

In addition to the legislations briefly described in table 1, biodiversity conservation, environmental protection, and conservation and use of aquatic resources have also been integrated into national and sub-national strategies, programs and plans, the key plans developed for all provinces include include the Socio-Economic Development Strategy and Plan (SEDS/P), and Agenda 21. Other key plans, programs, projects, and funds include:

- National Biodiversity Action Plan up to 2010 and with a vision to 2020 (Decision 79/2007/QD-TTg)
- Program for protection and development of aquatic resources, approved by the Prime Minister (Decision 131/2004/QD-TTg) (The Government, 2004)
- Establishment of fund for renewable aquatic resources in Vietnam (29/2007/QD-TTg)
- National project to protect endangered aquatic species by restocking freshwater fish into lakes and rivers.
- Master plan for inland waters protection that aims to protect, restore and regenerate aquatic resources, especially the rare and highly valued species, and to protect inland aquatic ecosystems by the year 2020 (approved by the Prime Minister).

Besides the Vietnamese legislations, Vietnam is signatory to a range of international conventions on environmental protection and biodiversity conservation, including the Convention on wetlands (Ramsar), Convention on International Trade in the endangered species (CITES), Convention on Biodiversity, the Cartagena Protocol on Biosafety.

#### **1.1.4. Limitation in the institutional and policy framework for conservation and use of aquatic resources**

Based on the two previous sections it can be concluded that the national framework of legislations regulating biodiversity conservation, environmental protection, and conservation and use of aquatic resources is comprehensive, however that there are a range of limitations in this framework in terms of inconsistencies/overlaps between different legislations and policies and related thereto an overlap between mandates between the institutions protecting and the institutions managing the aquatic resources (SEMLA 2009). There is moreover a lack of detailed guidelines for implementation laws and policies at sub-national levels, which combined with a weak capacity (e.g. the of lack on human resources, effective management tools, information and knowledge about national level legislations and policies) contribute to a weak implementation in practice (O'Rourke 2002), this is in particular the case at commune level. Moreover, while laws and secondary legislations to protect biodiversity and resources exist, the institutions to manage and control biodiversity have limited capacity to enforce the regulations and penalties, this is e.g. the case with the ban on use of destructive fishing gear (such as electrical pulses), which despite the Fishery Law and decree 28 and 127 (see table 1) being used in most areas (Interview, September 2010). A general limitation in the policy framework is the lack of the specifications for involvement of local communities in conservation and use of aquatic resources, e.g. co-management (Swan 2010), which is a contributor to the low level of active involvement and participation of local community groups in the resources management.

### **1.1.5. National and provincial poverty reduction policies and programs**

The Vietnamese Government has issued resolution 30a/2008/NQ-CP dated 27/12/2008, to support rapid and sustainable reduction of poverty in the 61 poorest districts, including Phu Yen and Dakrong, the two project study sites.

Accordingly, the Government has made special policies to support agricultural development, sustainable agri-forestry and orient to commodity production. In addition, it is enhancing infrastructure, transforming economic structures and forming an effective production organization. This effort is to build a stable rural society, tradition culture and ethnic identity, improving education, protecting environment. The Vietnamese government defined specific objectives for reducing the poverty rate to fewer than 40% by 2020.

In Phu Yen district, Son La province, there are many programs, projects and policies for poverty alleviation; Program 135 (support for essential infrastructure and agricultural production), Program 134/2004/TTg of the Prime Minister (supporting productive land, residential land, housing and water for a number of minority households in poor, hardly areas), Program in Poverty reduction by the World Bank (awareness training for local staff in village planning, budget setting, social development, the model agriculture and construction supervision), Program 925 (infrastructure development), Project 747 (socio-economic stabilization and development in the Da River resettlement area), Project 661 (Forestry Development). In addition, there are a number of supporting policies on education issues (tuition fee and per diem for ethnic minority children to attend college), livelihood (cost discount in iodized salt), agriculture equipment (seeds and life stocks) and communication (building radio stations for communes). These above issues are important and connection to livelihoods and quality life of local communes at HighARCS study site.

Policies and priorities of the government aiding Phu Yen district have been beneficial to economic and socio-cultural development. However, the investment efficiency is not high; the funding is too low and the infrastructure investments are not coordinated or sustainable, low educational levels, dependence and reliance on government support. The development of Phu Yen district is still limited (Phu Yen People's Committee 2009).

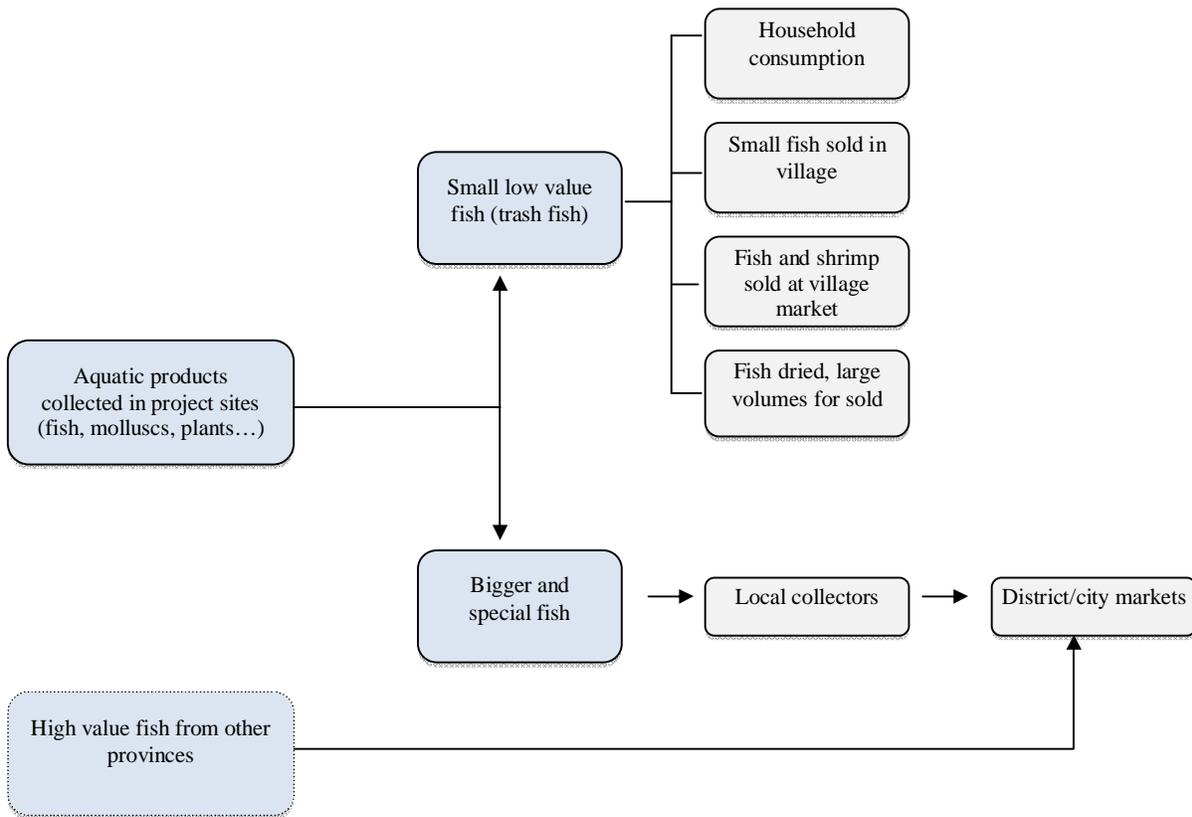
In 2003, Quang Tri Provincial People's Council issued Resolution 9g/NQ-HD through the project "housing support for poor ethnic minority in Quang Tri" and in 2004, the Government issued Decision 134/QD-TTg in support housing and drinking water for the poor and difficulty ethnic minority people (Quang Tri online 2010). In Dakrong district, Quang Tri province received massive support from the national program: Program 134, Program 135, Program 30A, as well as from international projects like CARE, PLAN, Save the Children and others. However, in spite of these efforts the work of poverty reduction in Dakrong (Quang Tri) has not achieved the desired results. Currently, the rate of poor households in the district is still high. According to statistics, this district has 48% poor households, of which 80% are ethnic minorities. In addition, nearly 40% of households in Dakrong live in circumstances close to the poverty level. The causes of poverty are lower educational level, lack of knowledge and experience in production, outdated living practices, high birth rates and limited access to health care. In addition, the poverty in Dakrong also relevant to harsh natural conditions such as; complex terrain, less productive land, low starting point, weak infrastructure and the threat of frequent natural disasters (Quang Tri online 2010). All these conditions lead to a low efficiency of Government support programs.

## Market network of aquatic products

This chapter presents the findings with regard to the market chain and aquatic products from the fish are caught and sold at village, commune, district, or city markets or to local collectors (middlemen). The chapter contributes to the basis for analysing the stakeholder's interests, dilemmas, and conflicts regarding aquatic resources and recommendations for advancing more sustainable management in the project sites.

### 1.6. Aquatic catch and markets in Phu Yen District, Son La Province

Research carried out in two communes Tuong Ha and Tuong Tien (Phu Yen district, Son La province) shows that fish is the main aquatic market product and fish are being sold in the network as follows:



**Figure 4: Fish market chain in Phu Yen District**

Fish collected are divided into big, high value fish and small, low value fish (trash fish). Normally, the big fish and special fish are sold to local collectors who will bring them to the city markets or restaurant.

Ms. Dang Thi Ngan from Phu Tho province (neighbouring district of Phu Yen), a fish seller at the market, goes fishing with her husband to Phu Yen by boat. Leaving their children at home she and her husband has registered as temporary residents in Tam Oc 2 village, Tuong Ha commune. Every day they go fishing on the river and every morning she carries fish to sell in the village and then finally sell at the district market. In October, she could catch about 3-5 kg per day including milkfish, catfish and mud carps under 200g. In addition, she also buys the cultivated fish from traders to sell at the market. Cultivated fish which are bigger with the size of 1-2 kg / fish are transported from lowland areas; and are mainly silver carp, common carp, mud carp and grass carp (Interview, January 2010).

**Box 1: Both fishing and selling fish**

Trash fish with higher volume are dried for sale, used for pigs as well as used for household consumption. Sometimes, the small fish are transported by bike to be mobile sold in the village (Figure 5). Fish and shrimp are also sold at the local market (Figure 5), which opens three times a month. This market is more important for ethnic minorities' living at the top of the mountain such as Hmong people who often take a day to go to the market to buy fish and other products such as salt, sugar candies, seeds and oil for lighting (field trip in Tuong Ha).



**Figure 5: Selling aquatic products mobile along the road by bike and at the local market**

Shrimp is an aquatic resource given its high sales potential in Son La Province. However, catch of shrimps in rivers requires the use of traps, which poor households are often not able to afford. Better-off households are able to independently invest in traps and negotiate and sell shrimps directly to retailers. The opposite is the case for poor and worse-off households that often lack credit to invest in traps. Poor people of Phu Yen cannot afford the traps and therefore often have to rent traps or enter into agreements with the retailers. One type of agreement is that the fishermen enter into agreements with retailers, who provide traps on the conditions that the fishermen only sell shrimps to the investor in order to pay back for the cost of the traps until the trap has been paid back. An alternative option allow the traders to define the price until they've covered their expenses, then the fishermen can sell shrimp to whomever they want (Household interview, 2010).

There are estimated one or two fish and shrimp collectors in the commune who collect shrimp in the village morning (5-7 am) and afternoon (5-7 pm) on a daily basis. Middlemen then buy all fish and shrimp for further distribution to cities such as Hanoi, Hai Phong and Hai Duong for sale. There are estimated three trucks used for the distribution of fish collected around watersheds in Phu Yen district and neighbouring areas which adds up to about 10 tons / day. In Phu Yen, restaurants often order fish, shrimp and snails from traders collected from streams (Restaurant interview, Sep 2010). There are 8-9 fish retailers in Phu Yen district markets, of which four sell river fish, including two people from Phu Tho province who both catch and sell fish directly. Because, the price of wild caught big fish is a lot more expensive than cultured fish, wild fish are sold in markets in the cities, while cultured fish are brought from other provinces to supply in Son La.

## **Threats and conflicting interests between development and aquatic resources conservation in the two provinces**

### **1.7. Stakeholders related to highland aquatic conservation**

The stakeholders involved in biodiversity and conservation of highland aquatic resources include:

- Fishermen: Those people have livelihoods heavily dependent on fisheries resources, part or their total income related to fishing.
- The traders: The wholesalers, middleman or small traders in fish and aquatic product.
- Consumers: consumers who use aquatic product as daily food or restaurants who cook aquatic product.
- Managers, staffs from the central to local agencies who are involve in agriculture, fisheries and environment management.
- Researchers: Researchers who participate in the study of fisheries resources, having knowledge in aquatic resources in mountainous areas.
- There are also non-governmental organizations active in the field of aquatic resource conservation, environmental managers and hydroelectric managements.

There are many development pressures on and threats to aquatic resources in Son La and Quang Tri provinces, including hydropower development, gold and mineral mining, agricultural cultivation, industrial activities, and deforestation.

According to a Government official in Phu Yen District (Interview, September 2010) is it challenging to balance economic development and aquatic conservation, and to ensure poverty reduction, food security and sustainable use of aquatic resources. The key finding with regard to pressures, threats, and conflicting interests are presented in the following sections.

### **1.8. Conflicting interests in hydropower generation and aquatic resources conservation**

The development strategy of Vietnam electricity industry in the period of 2006 – 2015 with orientation toward 2025 also gives priority to the development of hydropower and encourages investment in small-sized hydropower plants. It is estimated that total capacity of hydropower

plants shall reach to 15,000 MW by 2020. The Government encourages domestic and foreign enterprises to build small and medium scaled hydro plants (The Thien Nien Net 2011).

In Dakrong, it is reported that there are four hydropower stations built along 50km of Dakrong River.; Dakrong 1 in Huc Nghi commune with the capacity of 12MW, Dakrong 2 in Dakrong commune with the capacity of 14.4 MW and Dakrong 3 (8MW) and Dakrong 4 (21 MW) in Ta Long commune. The development of hydropower is creating changes in river streams and flowing speeds, thus leading to sedimentation, and erosion. Reservoirs create floods, which change the ecosystems and destroy their diversity (Vietnam Union of Science and Technology Associations 2007). There is no current report on the impact of hydropower to the biodiversity in Quang Tri. Moreover, in the objective and orient of project on develop social economic and quick poverty reduction in Dakrong district period 2009-2020, it is indicated that the district gives priorities to small scale industry development, especially mineral exploiting and hydropower. It will invest for 4 medium and small hydropower stations in Dakrong river (ACho hydropower in Huc Nghi commune, Ra Lây – Ba Nang, Giang Thoan in Huong Hiep commune and Rao Vinh in Trieu Nguyen commune) to create job and increase income for local people and increase budget for district (Quang Tri Planning and Investment Department, 2011).

In Phu Yen district, Tuong Ha and Tuong Tien commune are located on the reservoir of Hoa Binh hydropower with the capacity of 1,920 MW and Son La hydropower with the capacity of 2400 MW. In addition, according to the master plan 2009-2020 there will be more four small hydropower (Suoi Sap 1, Suoi Sap 2, Suoi Sap 3 and Muong Lang) with the capacity of 8-15 MW/hydropower in Phu Yen district (Phu Yen People Committee 2009). The fishermen in Phu Yen - Son La said that fish production is greatly reduced since hydropower stations were constructed; the construction of dams destroyed breeding ground, fish could not migrate to breeding areas, sediment load covered the living areas for fish, there are too many people involved in fishing and many of them use destructive fishing equipment (although banned) such as mine, electric, and small mesh nets (General notes from Tuong Ha and Tuong Tien observation interviews, 11/4-22/4) the construction of hydroelectric power leads to migration and resettlement, the population growth leads to excessive exploitation of natural resources, changing habitats, changing the natural living areas to make room for the activities of human life. However, a local authority said: “if we manage the hydropower well, the aquatic resources will not be affected” (Interview, Sep, 2010). There is an environmental impact assessment before the construction of hydropower, but there is no research on the changes in aquatic resources after (key informant interview, 1/2010). However, the construction of hydropower lead to change in land use; water filling up rice fields leading to ending of rice cultivation which forces people to cut down trees to create new planting areas. People in these areas use old cultivation techniques so productivity is low and poverty high which emphasizes deforestation and destructive fishing; finally, environmental have been continue destroyed. It is evident that the development of hydropower and the poverty are the most important factors for the declining in biodiversity in Phu Yen. This shows that there are many conflicting interests between the hydropower development plans and biodiversity conservation.

### **1.9. Conflicting interests between mineral exploiting and biodiversity conservation**

In Dakrong district, in the objective and orient to develop social economic and quick poverty reduction in Dakrong district period 2009-2020, the industry of mineral exploiting is given priority

to develop. District focuses to invest the exploiting sand and grit production line in Dakrong River (in Ba Long and Mo O commune). Invest for infrastructure and service for gold mining in A Vao, A Bung and Ta Long commune but using local labour and good management to limit environment impact and increasing budget for district. Currently, in Dakrong district, there are several places for gold mining. In Dakrong river at A Vao commune, there were hundred people came here to exploit gold in 2010. Gold mining created environmental pollution, soil erosion and water pollution along the streams, rivers and causing disorder in the region. The gold miner set up camps, using explosives and other means to exploit. In addition, local people use self-made instruments for gold mining that create noise in Dakrong river (www. thesaigontime, 2010).

In Phu Yen district, it is planned to have investment attractive policies for investors and companies come to exploit, process the mineral such as copper ore (Cu), lead ore (Pb), nickel...In the master plan, it is proposed to set up two factories to process copper ore in Gia Phu commune and lead – zinc processing in Muong Coi commune and build the ore exploiting station in Da Do and Suoi Bau commune. Furthermore, build a NKP fertilizer factory in Gia Phu to use the by-products from ore factories (Phu Yen People Committee, 2009).

Based on this, the exploiting of mineral will have a devastating impact on the environment and reduce biodiversity. It is clear that the master plan for mineral exploiting in Phu Yen and Dakrong is a Conflicting interest to biodiversity conservation.

#### **1.10. Conflicting interests between agriculture and biodiversity conservation**

In Phu Yen, there is a fact that agriculture production (rice farming, soybean farming, tea...) use chemical and pesticide that will discharge into the environment and causes water pollution. Many people said they were cultivated on high slopes, use of plant protection agents, pesticides. The rain will wash it off into rivers and lakes and create negative impact for (Focus group at Tuong Ha, Oct 2010). However, in the master plan of Phu Yen district in the period 2009-2020, it is encouraged to change structure in agricultural, focusing intensive farming, limited farming in high slope land, increase long-term industry trees (tea, rubber trees...) and increasing livestock. In addition, deliver forest land for household and communities manage it; try to have 17,455 ha forest in 2020 with the forest cover rate about 60% (Phu Yen People Committee 2009). Following this master plan, the livestock proportion will be high in agriculture structure, thus waste and chemical used will increase and effect to the environmental as well as biodiversity.

In Dakrong, it is planned to make concentrated production areas in agri-forest. It's encouraged to plant cereal trees, industry trees (rubber, pepper...) and providing land for planting the forest (Quang Tri Planning and Investment Department, 2011). It seems to be that there are no conflicting interests in policies in agriculture development and biodiversity conservation in Dakrong district.

#### **1.11. Conflicting interests between fisheries and aquatic conservation**

Fisheries and unsustainable aquaculture lead to negative impact on natural resources conservation in both Dakrong and Phu Yen district. The master plan of Phu Yen district for 2009-2020 encourages aquaculture, especially cage culture and fisheries in Da reservoir. It is estimated that the total aquaculture areas are 159ha in 2020 with the average production of 1.5-2 ton/ha of aquaculture. The total production of fisheries and aquaculture is 3588 tons (2015) and 6210 tons (2020). The main culture species are mud carp, common carp, silver carp, tilapia, frog, turtle etc. Following this

policy, cage culture and aquaculture with the introduced species will create an impact on environment and native species in this area. In addition, Son La province people live in very difficult circumstances; rice field loss due to flooding and the replacement of hydropower dams, low yield of maize and cassava due to soil erosion etc., therefore fishing is one of the main livelihood activities. Recently, illegal fishing with inappropriate net size and electric equipment has lead to decreasing aquatic resources. If policies encouraging fishing on the Da reservoir is carried out when illegal fishing is still an issue, the aquatic resources and biodiversity reduce rapidly.

The master plan of Dakrong district encourages local people to make an integrated system (pond-garden- livestock) in household scale. There is no fishery policy in the master plan but, fish is an important food source for local people and in recently aquatic resources are highly exploited and the indiscriminate fishing methods, such as use of poison and electric equipment are still present. The limitation in awareness of conservation and difficulties in livelihood has contributed greatly to the degradation on fish populations.

Local authorities believe that propaganda promoting the fishing law and awareness-raising in aquatic conservation is important for biodiversity conservation. However, fishing within the boundaries of the law does not provide the people enough fish to ensure survival so they are still pushed into illegal fishing. If fishing is strictly banned people lose their job and livelihood so there is no easy solution for this issue (Interview, 9/2010). Thus, it is important to educate people about the role of biodiversity in the livelihood of local people in the long term and create the alternative job for local people instead of fishing only.

### **1.12. Conflicting interests in factory development and environmental protection**

According to the master plan of Phu Yen district for 2009-2020, there will be four industry zones in Gia Phu, Huy Thuong, Huy Ha and Muong Coi communes. Following, there will be many factories build such as Tunnel brick factories, ceramic factories, textile and agriculture product processing factories (Phu Yen People Committee 2009). If all these factories are building and do not strictly comply with environmental regulations that will be great impact for water pollution. Recently, some processing facilities in Phu Yen district have discharged waste to the river and influenced the lives of local people. However, at district level, there is not enough equipment for water quality checks, and reports leading to penalties for the factories. Therefore, it is very difficult to prevent and stop the discharge waste of the factory (Interview, 9/2010).

In Dakrong master plan, some animal feed factories, food processing, handicraft, textile and wood processing will be built in district in the period 2009-2020 (Quang Tri Planning and Investment Department, 2011). If the district doesn't have a specific plan for environment management, the waste from these factories will create negative impact on environment as well as water quality and thus biodiversity.

## Legislation and policy in practice in the two provinces

### 1.13. The implementation of legislation and policy in Son La

#### 1.1.6. Provincial regulations on aquatic resources conservation

In Son La Province, the Fisheries Department, under DARD, is responsible for aquatic conservation and fisheries development for the whole province. Son La people committee has established a Department of Environment which is responsible for implementation of biodiversity conservation.

Son La province has paid attention to fisheries as well as aquatic resources conservation and Son La provincial People's Committee issued;

- Decision No: 57/QD-UBND dated 09/01/2001 on master plan fisheries development in Son La Province period 2000-2010”;
- Resolution: 20/NQ-TU dated 18/6/2007 by Provincial Party Committee about protection and development of aquatic resources in the period 2010 – 2015;
- Decision: 3002/QD – UBND dated 18/12/2007 by Son La People Committee to build action plan to implement the Resolution No. 20/NQ/TU dated 18/06/2007 on protection and development of aquatic resources in 2010 - 2015;
- Decision: 1530/QD – UBND dated 06/23/2008 that Son La People's Committee approving project in developing fisheries resources in the reservoir of Hoa Binh and Son La hydropower in association with stabilize life of people residing along the dam from 2008 to 2015.
- On 8th July 2010, Son La People Council issued “resolution 332/NQ-HDND that throughout the master plan for aquatic development from 2010 to 2015 and orientation to 2020.

In these decisions and resolutions there are three key issues related to the management and use of aquatic resources:

- Fishing in conjunction with protecting and developing fisheries resources. The protected areas are breeding grounds, places where juvenile fish lives in the rivers, streams, reservoirs and especially the breeding grounds in Da and Ma River.
- It is planning to restock fish to Hoa Binh and Son La dam every year.
- Priority investment to following directions: Survey and design of the breeding ground and protected areas for immature fish in Hoa Binh and Son La hydropower dam. Additional resources for Hoa Binh and Son La hydropower dam (restocking every year); Building fish markets on Hoa Binh and Son La dam; Building regulations to protect the migration, spawning grounds of the rare fish species such as Anh vũ (*Semilabeo notabilis* Peters, 1880), cá Lăng chấm (*Hemibagrus guttatus* Lacépède, 1803), cá Chiên *Bagarius rutilus* Ng & Kottelat, 2001), cá Râm xanh (*Sinilabeo lemassoni* Pelleggin & Chevey, 1936); Building the national reserve in Da River in Son La province; Building provincial protected areas in Ma river to protect aquatic ecosystem in combination with tourism, research and education (Son La People Council, 2010).

DONRE of Son La Province has developed training materials on environmental protection for commune staffs, business units for local people based on MONRE's guidance documents: "Responsibility and authority of the People's Committees of communes, wards and towns in accordance with the law on natural resources and environment" and the brochures: "Social organizations and unions with environmental protection laws"; "Households with environmental protection laws", "people's committees of communes, wards and towns with the Law on Environmental Protection"; "District People Committee with the Law of Environmental Protection". The documents indicate the responsibility of Committees at all levels in the conservation and development of natural ecosystems. Organizations and individuals who know species on the list of rare or endangered species are sick or losing habitat needs to report to rescue organizations or Commune People's Committee, which will report to specialized agencies of the province. However, there is neither specific implementation guidance in aquatic conservation nor any information on biodiversity conservation.

### **1.1.7. Implementation of regulations at district level**

In Phu Yen District the Office of Environment and Natural Resources has one employee responsible for environment management.

Phu Yen has used these documents to propagate to the public on environmental protection. Furthermore, under the guidance of the department of environmental resources of Son La province, Phu Yen district also issued guidelines and urging businesses to consider environmental protection and implementing environmental protection activities and certification is committed to protecting the environment (Phu Yen People Committee 2010). In addition, the Office of Natural Resources Environmental in Phu Yen has send written document directly to communes and towns for implementing the law on environmental protection. Furthermore, it also carried out the dissemination of legal education on environmental protection for people in the district (Phu Yen People Committee, 2010)

In Phu Yen district, Son La province, the management of water resources and the management and protection of the environment are carried out by district leaders. Department of Natural Resources Environmental examine and inspect the implementation of regulations on environmental protection of factories in the district and also guides and confirms the commitment on environmental protection for 15 business units. In 2009 the department recorded four factories, which did not follow the standards on waste disposal (Interview, 9/2010).

In Phu Yen, there was a pilot implementation in payment for environmental services recently, but it only applies to forest resources. Provincial people committee will carry out the environment impact assessment for proposal of projects and factories and thus consider cost and benefits in order to give permission or not. (Interview, 9/2010). Department of Natural Resources and Environment is responsible for environmental protection in the districts but it mainly focuses on urban environment and gives little attention on water environment. Since 2009, the Natural Resources and Environment Department has a budget to carry out propaganda on environment protection and has organized training for 293 people including commune leaders, land managers and village leaders on environmental protection laws (Interview, 9/2010).

### 1.1.8. Challenges in practice

The master plan of the district has little attention to biodiversity and local authorities have many other urgent tasks, which make this issue under prioritized. In addition, there are no specific guidelines and no funding for implementation of biodiversity conservation. Biodiversity conservation is related to many departments but no specific department is responsible for it. The Law of Biodiversity has not been communicated to district staffs with specific written instructions for implementation and both leaders and district staffs though aware of it, still lack the needed thorough understanding (Interview, 09/2010).

There is an employee in the Agriculture and Rural Development Department responsible for the management of fisheries. However, the other tasks such as irrigation, flood prevention, aquaculture extension also including, which makes conservation of fisheries resources is under prioritized.

In Phu Yen district, there is lack activity and budget for implementation to protect aquatic resources. Activities to protect aquatic resources are carried out directly by the Department of Fisheries (province level) or the department can assign some tasks and guide the Department of Agriculture and rural development (district) on how to carry them out it (interview 09/2010). According to the provincial action plan, the Department of Agricultural and Rural Development at district level is to set up and submit the development plan in agricultural, forestry and fisheries to the District people committee (DPC) that will then add it to the district development plan and submit it to the province for consideration. However, the proposed plan from the agriculture department is very clear and detailed, but in the district report it is shortened to only a summary (key informant interview, 2010).

Box 2. Activities to protect fisheries resources in Phu Yen district are not concerned. The district has not issued its own policies and only implements the policies given from the province and encourages people to perform. The Son La Department of Agriculture and Rural Development (DARD) has sent letter instructions on prohibiting the use of destructive fishing equipment but this has not received a lot of attention from the commune. In 2003, DARD organized training in cage culture and integration with dissemination in aquatic resources conservation. The promotional and dissemination aspects of fishery laws and regulations have not been implemented in recent years. DARD staff may lack of knowledge on how to protected fish species and its potential areas. It is observed that fisheries resources are declining, but local staff does not know how much declining it is and which specific fish species needs to conservation. There is weak co-operation between DARD and other departments in the field of environmental and aquatic conservation and the relationship of DARD and provincial departments of fisheries is as implementer and investor (Key informant interview, January 2010).

#### **Box 2: The protection of fisheries resources in Phu Yen, Son La**

In 2009, Phu Yen's DARD advised DPC to set up the project "Develop Fisheries in Phu Yen district in the period from 2009 to 2015" and send it to the provincial DARD. The proposal was for DARD at district and province level to cooperate with the Fisheries Department; It set up 2-3 breeding grounds in the dam belonging to Phu Yen district, and to build fish markets in Van Yen and Tan Phong by 2015 (Son La People Council, 2010). Phu Yen's DARD also proposed the following recommendations for aquatic conservation to the fisheries department:

1. Identify the existing natural resources: Research on the species composition and quantities in order to identify areas in need of protection and how to protect.
2. Implement the Fisheries Law: Make a list of prohibited and limited fish species, organize a fishing group that will determine the fish size at harvest, type and technical standards of fishing equipment (size mesh) and appropriate season for fishing; Illegal to use destructive fishing equipment such as explosives, electrical impulses, chemicals etc. and prohibit fishing on breeding season.
3. The construction of irrigation, hydropower, transport, industry in particular the processing industry needs to be evaluated to reduce the impacts on aquatic resources: ensuring the ecological environment, flow and water depth at the spawning grounds and prevent the dumping of waste and chemicals into water body.
4. Cá Lăng chám (*Hemibagrus guttatus* Lacépède, 1803, cá Chiên (*Bagarius rutilus* Ng & Kottelat, 2001), Cá Anh vũ (*Semilabeo obscurus* Lin, 1981), and Cá Anh vũ (*Semilabeo notabilis* Peters, 1880), cá Bống (*Spinibarbus denticulatus* Oshima, 1926).
5. Restock fish annually in order to enrich aquatic resources in the province.

It is clear that aquatic conservation is still limited of the district level due to lack of finances and human resources (Delphi, 2010).

#### **1.1.9. Implementation of regulations at commune level**

There are regulations on the use of mines in fishing, but there are no strong provisions or penalties for breaking the regulations on aquatic conservation at the commune level. It is recommended that should have clear document and guidelines from national to local commune in fishing regulations (e.g. mesh size, sustainable fishing methods...) to avoid destructive fishing. (Key informant interview, 2010). The existing regulations seem to be absent in the minds of local people and even local leaders. A campaign to establish the needed awareness on aquatic conservation and regulations would be of great use (Action plan, 2011).

### **1.14. The implementation of policies in Quang Tri**

#### **1.1.10. Implementing regulations at province level**

##### ***Biodiversity conservation & Environmental protection***

Quang Tri Province has paid attention to the conservation of biodiversity and issued a number of policies and implementation plans; "Action Plan on protection of biodiversity, biosecurity to 2010 and orientation to 2020 in Quang Tri province" (Quang Tri online 2010), from 2007 investment for resources and environment protection has increased, the Department of Natural Resources and Environment of province (DONRE) has collaborated with other departments and organized classes, propaganda, dissemination and thorough NQ 41/TU Resolution, Decision No. 79/2007/QĐ-TTg training in biodiversity for employees in all departments, agencies as well as leaders of the political and social organizations at provincial, district, town and city levels. Quang Tri province also established the Environment department under Quang Tri DONRE which exists in nine out of ten districts. Furthermore, Quang Tri PPC established three nature reserves to protect biodiversity; Dakrong, North Huong Hoa nature reserve and Con Co island marine protected areas.

Quang Tri Provincial People Committee issued “direction No 09/CT-UB in 1993 on environment protection” and “direction No 14/Ct-UB in 1996 on environmental impact assessment reporting”. In 2007, Quang Tri province produced an action plan for environment protection in Quang Tri province to 2020, which gives priority to the programs on rural environmental protection, biodiversity protection and education on environmental management.

#### *Aquatic resources conservation*

In 2006, Quang Tri Province People Committee approved the “Decision No 53/2006/QD-UB on fishery development planning to 2010”. In 2007, the Department of fisheries resources protection in Quang Tri province proposed a program to protect and develop aquatic resources in Quang Tri province in the period of 2007-2010 as followed: educating and raising awareness of aquatic conservation within the community, restoration, regeneration and development of fisheries resources; protection and conservation of the biodiversity of aquatic organisms (Quang Tri Department of Agriculture and Rural Development, 2007).

The prioritized investment projects in Quang Tri includes: Survey of the aquatic resources in Quang Tri, breeding indigenous fish species to restock aquatic resources, developing models for community management in fisheries resources, developing, implementing and communicating national action plans for aquatic resources conservation.

However, indicated that merging of Ministry of Fisheries with MARD to one ministry (MARD) has lead to less attention for fisheries programs and that many programs were proposed but not approved. In Quang Tri leaders has recognized the importance of aquatic resources and proposed many interesting ideas, however, there has not been a uniform approach in carrying out these ideas (Key informant interview 01/2010).

#### *Limitations in the conservation of biodiversity in Quang Tri*

The following outcomes were from the Delphi of HighARCS project in 2010:

- The implementation of policies in biodiversity conservation is not carried out especially fishing in the sea, lakes, rivers and streams by electric shocks, explosives, toxic etc. is still evident.
- The rules have not strong enough to prevent illegal activities affected to biodiversity conservation.
- The management system in districts and communes is not strong enough and lacking qualified staffs.
- The management of biodiversity is part-time tasks of staffs and the collaboration between organizations is inefficient or a duplication of management functions.
- Financial investment for biodiversity conservation is limited which makes implementation of policies difficult and there is neither equipment nor facilities for inspection and biodiversity monitoring.

#### **1.1.11. Implementing regulations at district level**

In Dakrong district there is one employee in the Department of Agriculture and Rural Development responsible for the field of animal husbandry and aquaculture, but there is no specific policy on

aquatic biodiversity conservation (Key informant interview of Department of Agriculture and Rural Development of Dakrong, 2010)

The Department of Natural Resources and Environmental has mapped rivers and streams of the district however, the department is mainly responsible for land and soil management and do not do specific tasks in aquatic resource conservation (Key informant interview of Department of Natural Resources and Environmental, 2010). Recently, illegal gold and mineral mining has occurred in Dakrong which has caused huge negative impact to environment. The District People Committee has carried out many campaigns to solve this but the number of polices is limited and the gold miners are intelligent and has managed to escape whenever they know the police to come (Key informant interview of Department of Natural Resources and Environmental, 2010).

### **1.1.12. Implementing regulations at commune level**

In Dakrong, there is neither policy nor regulation on aquatic conservation at commune level. Local people's claims about the fish resources being degraded because of (1) soils erosion; (2) the hydropower station; (3) sand mining as well as (4) the flushing out of residues from the coffee production. Local people said that there are only few people involve in fishing while HighARCS discovered that fishing is one of important daily food for local people.

## **Recommendations**

Based on findings and analysis of this study, the following key recommendations related to policies, institutions, and implementation in practice, should be considered when developing the action plans for sustained provision of ecosystem services, in view of improved resource use, tackling user conflicts and conserving aquatic resources:

- **Integration of biodiversity conservation into development plans:** it is recommended that biodiversity issues and targets are more fully integrated into the SEDPs of the People's Committees at Provincial, District, and Commune levels to ensure a more integrated approach to development and conservation and to enable budget allocation for conservation qua the SEDPs.
- **Addressing the issue of overlapping institutional mandates:** it is recommended that functions and tasks for aquatic resource conservation should be clarified and the detailed responsibilities at sub-national levels developed. Moreover, the provinces should develop a shared database where all documents and data are uploaded and easy to use for any employee from any department working in the field of natural resources. This data base would also help in new policy making, making it easier to ensure coordination and that all policies aimed at controlling biological resources are active and taken into account when making new policies.
- **Enhancing management and technical capacity of technical units at all sub-national levels:** by clarification of the management areas (as mentioned above), and by building management and technical capacity for staffs and creating full time positions in all departments, districts and communes is essential in order to implement existing and future policies properly.
- **Strengthening enforcement of regulations:** it is recommend to 1) develop detailed guidelines for provinces, districts, and communes, and 2) to enhance the human resources

for implementing the laws and regulations. This could be done with security teams for better and stricter management of destructive fishing. Binding funds for supervision would bring more attention to control and implementation of regulations, which is essential in assuring implementation and compliance to the laws and regulations.

- **Enhancing community participation for improved management and use of aquatic resources:** To address the challenge with lack of staff capacity for aquatic resource management, we recommend decentralization in management aquatic and encouraging local people to participate in management aquatic resources and build regulation in village to protect aquatic resources. This should also include the mobilisation of a budget specifically for enhancing local people's knowledge about fish stock and aquatic environment issues.
- **Balancing poverty reduction/alternative livelihood creation and aquatic resource conservation:** to address the issue of it is recommended that 'green' jobs are created ie. by starting environmental initiatives like green energy businesses or payments for protecting the environment when making a living.
- **Building a shared understanding of aquatic resources and the extent of fishing in Dakrong District:** it is recommended to conduct an in-depth participatory analysis of the extent of fishing and its importance in the local community could help understand the complexity of the problem. It is obviously also important to make policies and regulate according to the revelations in order to decrease the fishing.
- **Improving wastewater monitoring in Phu Yen District:** the problem of illegally discharged waste needs more attention. Having someone assigned specifically for control and supervision of water quality would be an improvement on its own. However, there is insufficient equipment for water quality control, which complicates the report making necessary for catching and fining the polluters.
- **Addressing the negative impacts of mining:** the development plans for mineral exploiting in Phu Yen and Dakrong is a conflicting interest to biodiversity conservation as exploitation has devastating effects on the environment. Mineral exploitation should be minimized in areas with vulnerable natural resources and regulations to reduce its impact on environment should not only be strengthened but also communicated and enforced. Since campaigning has proven insufficient to solve the problem of illegal gold and mineral mining on it's own it's important to strengthen the policies regarding illegal mining. Once strengthened, the policies need to be backed up with budgets for implementation and supervision.

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### **Section 3**

**Institutional, Policy, and Conflicts Report, Uttarakhand Site, India.**

**HIGHLAND AQUATIC RESOURCES CONSERVATION AND SUSTAINABLE DEVELOPMENT**

**D5.1**

**INSTITUTIONAL, POLICY AND CONFLICTS REPORT**

**UTTARAKHAND SITE, INDIA**



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## HIGHLAND AQUATIC RESOURCES CONSERVATION AND SUSTAINABLE DEVELOPMENT

### INSTITUTIONAL, POLICY AND CONFLICTS REPORT UTTARAKHAND SITE, INDIA

#### **Executive summary**

The institutional and policy report is an effort to understand the legal and policy aspects regarding the various issue related to environment and protection of natural resources. This provides an in-depth knowledge of the policy framework which would facilitate in the situation analysis as well as in action plan implementation. Environmental law deals with issues pertaining to environmental conditions such as air pollution, water pollution. The policies which are prescribed by the Government can be applied only by taking into considerations local situations and conditions. Such policies provide the framework within which local policies could be implemented.

The environment Protection Act is the umbrella legislation for environment protection and improvement through regulation of developmental activities. Biodiversity Act of 2002 is the most important policy on the environmental protection and provides for conservation of biological diversity and sustainable use of its components and permits fair and equitable sharing of benefits arising out of the use of biological resources.

For poverty alleviation and employment generation the most important step was taken by the Indian Government to remove poverty and ensure employment by implementing the National Rural Employment Guarantee Bill which would provide at least 100 days of guaranteed wage employment in every financial year. Also other Government schemes such as Indira Awas Yojana, Pradhan Mantri Gramodaya Yojana are applicable. In the HighARCS field sites, 90 households were interviewed and it was found from the interview that some of the houses were built under the Indira AwasYojana Scheme.

Other local authorities such as Lake Development Authority (LDA), Nainital Nagar Palika Parishad (NNPP) and Irrigation Department are instrumental in management and conservation of aquatic resources and for carrying out various projects for the conservation.

In Nainital, Bhimtal and Naukuchiatal are not much industrial development has taken place. Tourism is the major industry for earning livelihood for the people. The various tourists' spots which are promoted as well as the different tourism opportunities provided by Uttarakhand Government have promoted tourism to a great extent.

A few Non-Governmental Organizations (NGO's) such as Chirag, Chea, Gawal Sena has been operating in the area for the benefit of the people.

Certain local bank such as Kisan Bank has been set up by the Central Government to cater to the needs of the farmers by helping them to buy inputs like seeds, fertilizers, farm equipments.

There seems to be a lot of legislation and policy frameworks regarding the conservation of natural resources, environmental protection and also development of sustainable livelihood. However, there should be strict following as well as implementation of the rules for more effective outcomes.

Projects can be undertaken on the basis of these policies for better results on conservation as well as sustainable development. Knowing of the policy framework provides a quicker settlement of conflicts which are aroused during the implementations of various policies. So, a proper knowledge of the legislation serves to implement a consistent solution.

Finally, on the basis of these Governmental policies and the policies formulated by the local institutions, Action Plans will be formulated which will be beneficial for the conservation of the biodiversity of the lakes as well as for sustaining the livelihoods of the people. The local people form an integral part of this entire project and they are the ones who would be able to say how far they are benefitted from a particular policy action plan. At every step, State Institutions should be involved which are taking up different projects for the Conservation of the Lakes as well as for the well being of the people.

The prescription in the form of action planning to be offered by HighARCS cannot be generalized and applied to address the problems that the resources are facing, but it must be modified to suit the local conditions and habits of the people and it should not be detrimental to their living or their sentiments, most importantly it must be legally abiding for its implementation. Although conflicts of interest can be settled through arbitration but still the legal framework provides the last resort. The role of Central Government and State Government is immensely profound in this respect as they develop national strategies, plans, programmes for the conservation and promotion and sustainable use of biological diversity and protection of biodiversity rich habitats threatened by overuse, abuse or neglect. There should be an endeavor to respect and protect the knowledge of local people relating to biological diversity, as recommended by the NBA. Also, procedures of assessment of the impact of projects on environment and biodiversity should be enforced to regulate, manage or control the risks or adverse impact of use and release of living modified organisms on conservation and sustainable use of biological diversity and human health. State Government in consultation with the local bodies, notify biodiversity heritage sites and frame rules, for management and conservation of all the heritage sites (in consultation with Central Government) and launch schemes for compensation rehabilitation of affected people.

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## LIST OF ABBREVIATIONS AND ACRONYMS

APEDA	Agricultural and Processed Food Products Export development Authority
BJP	Bhartiya Janata Party
BOD	Biological Oxygen Demand
BPL	Below Poverty Line
BSP	Bahujan Samaj Party)
CAA	Coastal Agricultural Authority
CAMPA	Compensatory Afforestation Fund Management and Planning Management
CBD	Convention on Biological Diversity
CDH	Conservation, Development and Harvesting
CDP	City Development Plan
CEC	Central Empowered Committee
CHIRAG	Central Himalayan Rural Action Group
COP	Conference of Parties
CPCB	Central pollution Control Board
CRZ	Coastal Regulation Zone
DC	Divisional Commissioner
DCF	Directorate of Coldwater Fisheries
DM	District Magistrate
DNN	Dehradun Nagar Nigam
DO	Dissolved Oxygen
DPC	District Planning Committees
DPR	Detailed Project Report
EPA	Environmental Protection Act
FAO	Food and Agriculture Organisation
GMVN	GarhwalMandalVikas Nigam
HighARCS	Highland Aquatic Resources Conservation and Sustainable Development
ARIES	Aryabhatta Research Institute of Observational Sciences
HNP	Health, Nutrition and Population
IBA	Indole Butyric Acid
INM	Integrated Nutrients Management
IPM	Integrated Pest Management
IPR	Intellectual Property Rights
JFM	Joint Forest Management
JNNURM	Jawaharlal Nehru National Urban Rural Mission
KGU	Kumaon Grameen Udyog
KMVN	Kumaon Mandal Vikas Nigam
LDA	Lake Development Authority
MAP	Medicinal and Aromatic Plants
MFPI	Ministry of Food Processing Industry
MLD	Million Litres per Day

MoEF	Ministry of Environment & Forests
MPC	Metropolitan planning Committees
MPCA	Medicinal Plant Conservation Areas
MSW	Municipal Solid Waste
MT	Metric Tons
MW	Mega Watt
NBA	National Board of Accreditation
NFAP	National Forestry Action Program
NGO	Non Governmental Organisation
NHB	National Horticulture Board
NIH	National Institute of Hydrology
NLCP	Nainital Lake Conservation Project
NLCP	National Lake Conservation Plan
NLRSADA	Nainital-Lake-Region Special Area Development Authority
NLRSADA	National Lake Region Special Area Development Authority
NNPP	Nainital Nagar Palika Parishad
PCC	Pollution Control Committee
PWD	Public Works Department
SC/ST	Scheduled Caste/ Scheduled Tribe
SEC	State Selection Commission
SFC	State Finance Commission
SIDCUL	State Infrastructure and Industries Development Corporation of Uttaranchal
SP	Samajwadi Party
SPCB	State Pollution Control Board
SPV	Special Purpose Vehicle
SSI	Small Scale Industries
STP	Sewage Treatment Plants
SUDA	State Urban Development Agency
TCPO	Town and Country Planning Organization
TOF	Trees Outside Forest
UEPPCB	Uttaranchal Environment Protection and Pollution Control Board
UFW	Unaccounted For Water
UJS	Uttarakhand Jal Sansthan
UJVNL	Uttarakhand JalVidyut Nigam Limited
ULB	Urban Local Bodies
UN	United Nations
UNDP	United Nations Development Program
UPC	Uttaranchal Power Corporation
UPJN	Uttarakhand Pey Jal Nigam
WFN	Worldwide Fund for Nature
WII	Wildlife Institute of India
WTI	Wildlife Trust of India

# 1. INTRODUCTION

## *1.1 Background and overall research question*

According to the Project Document of the HighARCS project, Work Package 5 aims to assess the role of key actors and stakeholders in regulating and managing highland aquatic resources in each of the study sites. As an integral part of this effort, relevant policy and legislation is identified and assessed. The Report on Institutions, Policy and Conflict (Deliverable 5.1) in context aims to provide a firm understanding of the legal and policy framework of India and that of the very state, Uttarakhand situated in the lap of Himalayas where the HighARCS site is located, livelihoods associated with the resources are pursued and conflicts of interest settled. A thorough knowledge of the policy framework and the legal system further helps the situational analysis as it is complementary with the conception of action planning and its implementation in the near future.

In our research, as we have stated earlier the site that has been chosen is the Land of Uttarakhand, which is a land blessed with Mother Nature. It is a part of Indian Himalayan Range and its environment is lucrative and soothing to the mind and soul. The Government of India and the state government have launched many schemes to attract tourists from around the globe to have a pleasurable experience of life here. One can find oneself very near to nature and experience bliss as it is rich with both flora and fauna. It is well marked as the originating point of the Divine rivers- Ganga and Yamuna. It has also been called as “DevBhoomi”. Devbhoomi means Abode of God, since Uttarakhand is rich in divine and historical places like temples, monuments etc. Its forest cover is about 45.74% of its total land area (3.60% of India's total forest cover). [1]

The HighARCS project sites have been chosen around Nainital. Nainital is known as the Lake District due to a large number of lakes in the area. The presence of more than a hundred lakes has been recorded up until the nineteenth century. Our study concentrates on three of the most famous lakes amongst them- Nainital Lake itself, Bhimtal, and Naukuchiatal lakes. These three lakes are the most important water bodies in Nainital in terms of their environment importance and tourist attraction.

The lakes are an important natural resource for the community as it is used for attracting the tourists, for boating, and lake water is also used for irrigation purpose, fishing activities and drinking water.

However, the aquatic environment of the lakes has been impacted negatively (eutrophication, loss of biodiversity) by the growing pressures from waste and wastewater mainly due to the increased tourism and the urbanization having occurred around the lakes (HighARCS WP 3 report, 2011). The three lakes studied represent different stages of urbanization and degradation of the aquatic

resources, Lake Nainital being the most heavily impacted (but also now more strictly managed and protected). The present report gives an overview over the legal and institutional framework within which issues of environmental management of the aquatic resources and improved livelihoods in the area are evolving, as well as the existing policies and occurring trends of economic development, livelihoods and environmental protection.

## ***1.2 Scope and structure of the report***

The report has been structured according to a common framework used at all five study sites of the HighARCS project, but adapted by each of the teams individually. The Uttarakhand report mainly highlights the legal framework relevant for the management of highland aquatic resources. Hence the majority of laws and policies, which are to be analyzed fall under the category of environmental laws. As the HighARCS project is also concerned with the livelihoods associated with the aquatic resources, labour laws, human rights laws and social security laws also form an integral part. This is evident of how law and society are intertwined. Since we are also interested in biodiversity protection and sustainable development, environmental law acts as a firm ground in this context. Thus we can observe why an understanding regarding the laws and policies is required. In India, environmental resources are more or less classified as free goods, thus implicating a need for framing laws to protect it along with solving conflicts arising with its usage.

The remainder of the report is structured in four main parts. In chapter 2, before focussing in on the study site area in Uttarakhand, the main characteristics of the practices of sustainable management of aquatic resources in India today are presented as a context for the situation at the HighARCS study sites. This includes an initial overview of the political and administrative organisation of India intended as background for readers not familiar with the Indian context. Likewise, the overall national policies pursued on environmental protection, poverty alleviation and sustainable livelihoods are introduced.

The following chapters focus on the HighARCS study sites at the three lakes in the Nainital Lakes area. Chapter 3 gives an introduction to the administrative structure of the Nainital Lakes area, presents data on the policies of economic development and improved livelihoods currently existing in the Lake region as well as the role of local markets for fish and agricultural cashcrops in order to identify and understand the institutional drivers creating environmental pressures on the aquatic resources.

Chapter 4 reviews the main pressures or environmental management problems of the aquatic resources in the Nainital Lakes District.

Chapter 5 presents an overview of the institutions and stakeholders concerned by the environmental management issues, and sketches out the trajectory of management responses that

have been given to them to date. The chapter concludes on the aquatic resource management issues to be addressed in HighARCS action planning.

### ***1.3 Methodology and sources of data***

The methodological approach used has been inspired by the framework given in the IUCN Guidelines “An Integrated Wetland Assessment Toolkit” (Springate-Baginski et al. 2009). A major effort has been made in collecting the texts of the relevant existing laws, but much of the information gathered on existing government policies and programs has been collected as secondary materials from available internet sites of government institutions, NGOs and public newspapers or official reports obtained from various government offices. At the local level, expert interviews and consultation with resource persons from government institutions or local organizations has been a frequently used form of data collection strategy. Moreover, focus group discussions were held with community members in connection with the overall data collection activities for the Work Packages Three and Four of the HighARCS project. The sections on the political system of India have mainly been compiled using information and formulations available on the official websites of the Government of India or official websites of international organizations.

## **2. THE GOVERNANCE SYSTEM IN INDIA**

### ***2.1 The political and administrative organisation of the Indian society***

#### **2.1.1 Federal System [2]**

India, a union of states, is Sovereign, Socialist, Secular, Democratic Republic as stated in the Indian Constitution with a Parliamentary form of Government. The Indian Polity is governed in terms of the constitution, which was adopted by the Constituent Assembly on 26 November 1949 and came into force on 26 January 1950.

The President is the constitutional head and Executive of the Union. Real executive power vests in the hands of the Council of Ministers with the Prime Minister as head.

The Council of Ministers is collectively responsible to the Lok Sabha, the House of the People. In the states, the Governor, the representative of the President, is the head of Executive, but real executive power rests with the Chief Minister who heads the Council of Ministers. The Council of Ministers of a state is collectively responsible to the elected legislative assembly of the state. The Constitution governs the sharing of legislative power between Parliament and the State Legislatures, and provides for the vesting of residual powers in Parliament. The power to amend the Constitution also vests in Parliament. The Union Executive consists of the President, the Vice

President and Council of Ministers with the Prime Minister at the head to aid and advise the President.

### **The President and Vice President**

The President is elected by votes of each members of an electoral college consisting of elected members of both Houses of Parliament and Legislative Assemblies of the states. The President has 5 years to complete his term. On the other hand the Vice-President is elected in the same way as the President, and holds office for five years. The Vice-President is the Ex-officio Chairman of the Rajya Sabha which is another House of Parliament and its members are elected by the elected representatives of the people, the Electoral College comprises of Lok Sabha and State legislature members.

### **Council of Ministers**

The Council of Ministers comprises Cabinet Ministers, Minister of States (independent charge or otherwise) and Deputy Ministers. Prime Minister communicates all decisions of the Council of Ministers relating to administration of affairs of the Union and proposals for legislation to the President.

### **Rajya Sabha and Lok Sabha**

The Rajya Sabha consists of 245 members. Of these, 233 represent states and union territories and 12 members are nominated by the President. Members are elected in Rajya Sabha indirectly by the already elected members of Legislative Assemblies of the concerned states. On the other hand, election of representatives of Lok Sabha are directly done on the basis of the adult universal suffrage which now leads to 545 members with 2 members referred by President for representing Anglo Indian Community.

Akin to Government of India, the system of government in states remind us that of the Union. There are 28 states and six Union territories and one National Capital Territory in the country. Union Territories are administered by the President through an Administrator appointed by him.

#### **2.1.2 Legislative Relations between the Union and States [3]**

Under the Constitution, Parliament has the power to make laws for the whole of or any part of the territory of India. The State Legislatures have the power to make laws for the States. Parliament has the special right to legislate in respect of items such as defense, foreign affairs, currency, income tax, excise duty, railways, shipping, posts and telegraphs, etc.

Similarly State Legislatures practice laws in relation to items like public order, police, public health, communications, agriculture, lotteries, taxes on entertainment and wealth, sales tax and octroi, etc.

Both Parliament and the State Legislatures have the power to legislate in items of the Constitution which includes items like electricity, newspapers, criminal law, marriage and divorce, stamp duties, trade unions, price controls, etc.

With regards to the legislation on the environment and on biodiversity, the Parliament of the Federal (central) Union has the authority to make the laws. These laws are mainly implemented through the Ministry of Environment and Forestry at the State Level, but they have to be endorsed by the local State, and local State-level amendments can be made to existing nationwide legislation. According to our interviews with the local authorities in Nainital, there are no specific State laws enacted to environment and biodiversity. Some programs as mentioned in the report in Chapters 3 and 4 were executed to protect the environment and biodiversity and the organizations protect the lake environment only on the basis of the nation-wide legal texts, and not following any specific local laws.

### **2.1.3 Local government institutions [4]**

In India the local government is the third level of government apart from the State and Central governments. There are two types of Local Government in operation: Panchayats in rural areas and Municipalities in urban areas.

#### **Panchayats and Municipalities:**

The Panchayats are a linked-system of local bodies with village panchayats (average population about 5,000), panchayat samities at the intermediate level (average population about 100,000), and district panchayats (average population about 1,000,000).

In 1991, through two identical constitutional amendments, one for the Panchayats and the other for the Municipalities, a number of changes were introduced to strengthen local governments in India ensure regularity of their election every five years and limiting their period of super session or dissolution to six months, three sets of local local governments for the Panchayats and the Municipalities, reservation of seats and chairpersons for women and scheduled castes and tribes, creation of independent state selection commission (SEC), state finance commission (SFC) linked with the central finance commission, and planning committees at the districts (DPCs) and metropolitan areas (MPCs).

Panchayats act mostly as agencies for implementing the erstwhile soviet plan schemes and projects on cost reimbursement (around 96% of their activities) that do not have any maintenance component for transferred completed works.

The major national parties are committed to improve the effectiveness of the Panchayats through further central action to remedy the situation. Also irrigation facility has developed in these

regions. For agriculture this irrigation facility has been helpful. All these developments have taken place under this Pradhan Mantrak Gramodyaya Yojana scheme.

#### **2.1.4 The role of Civil Society (NGOs, associations) [5]**

The root of an Indian autonomous civil society is not to be found in the contemporary rise of a modern state but foremost in the ancient and medieval history of the country. Caste “panchayats”, village “panchayats”, or traders guilds all illustrates forms of local institutions that had long been untouched by the vicissitudes of the political spheres and remained autonomous from state control. However, the modern definition of an Indian civil society has to confront the radical transformation of the State and its consequences on the role of the non-state actors. Civil society first has a role of enabling the hitherto voiceless and unorganized communities’ interests to be represented. In other term, the sphere of civil society has a goal of empowerment for local communities. Civil society can also be considered as a “movement” that has to influence public negotiation on public issues like health, education or security. Civil society finally has a role of “ensuring the accountability” of the State in different spheres. Ensuring the right to access to information is a first step into the State accountability, in a country where the Official Secret Act<sup>1</sup> predominates. In a more general way, civil society has the monitoring function of holding “the law and order machinery accountable”. This function implies the control of political parties and electoral process, the control of local bodies etc.

This specific definition of civil society points out the problematic relationship between State and Society in India. More than a mere intermediary between the individuals and the State, civil society appears as a form of protection, a guarantee of political participation, a “counter-weight” to the overall power of the State. Such a definition presents civil society mostly through its “palliative” function, faced to the dysfunctions of the State, and thus calls for a deep governance reform in India.

#### **NGOs: [6]**

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<sup>1</sup> According to Wikipedia, “the **Official Secrets Act 1923** is [India's](#) anti-[espionage](#) act held over from British [colonisation](#). It states clearly that any action which involves helping an enemy state against India. It also states that one cannot approach, inspect, or even pass over a prohibited government site or area. According to this Act, helping the enemy state can be in the form of communicating a sketch, plan, model of an official secret, or of official codes or passwords, to the enemy. The disclosure of any information that is likely to affect the sovereignty and integrity of India, the security of the State, or friendly relations with foreign States, is punishable by this act.” (Source: [http://en.wikipedia.org/wiki/Official\\_Secrets\\_Act\\_\(India\)](http://en.wikipedia.org/wiki/Official_Secrets_Act_(India)); accessed 21-09-2011)

NGO i.e. non-government organization is an autonomous voluntary sector working for the society welfare. They are mainly constituted to fill in the gaps left by the government in the development process.

In the 1980s, however, the groups who were now known as NGOs became more specialized, and the voluntary movement was, in a way, fragmented into three major groups. There were those considered the traditional development NGOs, who went into a village or a group of villages and ran literacy programmes, crèches for children and clinics, encouraged farmers to experiment with new crops and livestock breeds that would bring more money, helped the weavers and other village artisans market their products and so on - in short became almost a part of the community in their chosen area (usually in rural India) and tried to fill all the gaps left in the development process by the government. The second group of NGOs was those who researched a particular subject in depth, and then lobbied with the government or with industry or petitioned the courts for improvements in the lives of the citizens, as far as that particular subject was concerned. In the third group were those volunteers who saw themselves more as activists than other NGOs did. Of course, all NGOs undertook a certain amount of activism to get their points across - they petitioned the bureaucrats, they alerted the media whenever they found something wrong and so on. But this third group of NGOs saw activism as their primary means of reaching their goals, because they did not believe they could get the authorities to move in any other way.

India is a representative rather than a participatory democracy. Once the elections are over, the politicians who run the federal and state governments do not really need to go back to the electorate for every major decision - there is no tradition of referendums in India. So, in the five years between one election and another, the NGOs - and parts of the media, to some extent - are often the only means available to the citizens to voice their opinions on any decision taken by a government. In a large developing country like India, there are numerous gaps left by the government in the development process - sometimes by intention, sometimes due to lack of funds, sometimes due to lack of awareness. These are the gaps that many NGOs try to fill in modern India. Some of them may work in areas that the government does not want to get into - like fighting discrimination on the basis of caste. Most Indian politicians do not really want to upset the existing caste hierarchy in his or her constituency, because the politician is dependent for votes on the dominant castes of that particular constituency. In the process, laws prohibiting discrimination on the basis of caste are often ignored unless there is an NGO working in the area that is willing to take up the cause of those being discriminated against.

## ***2.2 Indian legislation and policies relevant for HighARCS***

### **2.2.1 Introduction**

In the following sections, the Indian legislation and policies relevant for aquatic resource biodiversity conservation, management, and sustainable livelihoods at the HighARCS study site

in Utterakhand are presented. First, the various legal acts and policies aiming environmental protection and natural resource management in India are presented. This is followed by an overview of the major policies and programmes relevant to concerns of socio-economic development and improved livelihoods and which in turn influence current management practices of the aquatic resources and contribute to current resource problems management

### **2.2.2 The concept of law [7]**

Law is a system of rules, usually enforced through a set of institutions. It shapes politics, economics and society in numerous ways and serves as a primary social mediator of relations between people. Legal systems elaborate rights and responsibilities in a variety of ways. In a typical democracy, the central institutions for the creation and interpretation of law are the three main branches of government, namely an impartial judiciary, a democratic legislature, and an accountable executive. To implement and enforce the law and provide services to the public, the government's bureaucracy, the military and police are vital. While all these organs of the state are created and bound by law, an independent legal profession and an active civil society inform and support their progress.

A sound legal system is an apposite pointer of a society's existence and policy framework is just a mode to make the society an entity. Laws and policies make every character of the society accountable before the law, government or the people, hence cultivating a sense of responsibility. Policy backing is required for defining the responsibilities which helps to make an approach towards a more civilized and modernist society.

### **2.3 *Environmental law and activities involved for the protection of the environment in India [8]***

Environmental law is an intermingled form of treaties, conventions; statutes, regulations, and common law. The laws are activated not only to legalize the interface of human race with the rest of the natural environment where humanity survives but also to blame for its annihilation. Thus environmental law is regulated for the purpose of dipping the shock of human activity, both on the natural environment and on humanity itself. The topic may be divided into two major subjects: (1) pollution control and remediation, (2) resource conservation and management.

Laws dealing with pollution pertain only to a single environmental medium, such as air, water (whether surface water, groundwater or oceans), soil, etc. - and control both emission of pollutants into the medium as well as the liability for exceeding permitted emissions and responsibility for cleanup. From an economic perspective environmental laws may be understood as concerned with the prevention of present and future externalities, and preservation of common resources from exhaustion encompassing a wide variety of issue areas, linking terrestrial, marine and atmospheric pollution to wildlife and biodiversity protection. Laws regarding resource conservation and management generally focus on a single resource - e.g., natural resources such

as forests, mineral deposits or animal species, or intangible resources such as scenic areas or sites of high archeological value. They provide guidelines for and limitations on the conservation, preservation, disturbance and economic exploitation of these resources. These areas are not mutually exclusive - for example, laws governing water pollution in lakes and rivers may also conserve the recreational value of such water bodies. Thus to protect biodiversity, it is necessary to place environmental law in a primary position in political and judicial decisions as it has consequences for biodiversity. It can define protection for threatened ecosystems as well as some rights and duties (for example, fishing and hunting rights) associated with it.

Environmental law is erected mainly to protect our environment from environmental degradation caused by both natural and human activities. The important environmental legislations in India are - The Environment Protection Act, 1986, The Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act 1981, The Indian Forest Act, 1927, Forest (Conservation) Act, 1980, Biological Diversity Act, 2002, Declaration of Coastal Stretches as Coastal Regulation Zone (CRZ) Notification, 1991, Wildlife protection act ,1972, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995 and The National Environment Appellate Authority Act, 1997.

### **2.3.1 The Environmental Protection Act (EPA) [9]**

**Environmental Protection Act (EPA), 1986** was enacted pursuant to the UN Conference on the Human Environment held in 1972. It mainly pursues environment protection and improvement through regulation of developmental activities. It vests Central Ministry, i.e., Ministry of Environment & Forests (“MoEF”) with powers relating to formulation of nation-wide planning, policymaking and co-ordination of actions taken by State Governments. Within the umbrella framework under the EPA it considers the issues relating to standards for discharge of environmental pollutants, land use regulation, waste management, environmental impact assessment, regulation of developmental activities in coastal stretches, management of chemicals and noise pollution,

EPA enables MoEF to carry on following activities;

- Lay down standards for environmental quality; emissions or discharge of environmental pollutants from various sources.
- Devise procedures for handling hazardous substances.
- Formulate rules for locating industry.
- Mandate compulsory reporting of environment pollution by industry.
- Provide for recovery of costs of cleanup from the polluter.

### **2.3.2 National policies on water resource management**

Water is a unique substance. It is one of the few materials on the Earth that exists naturally as a solid, liquid or gas. It is not possible for life on earth to exist without water. From a global viewpoint fresh water is abundant and the volume of fresh water renewed by the hydrological cycle between the oceans, the atmosphere, the sun and the land is more than enough to meet the needs of five to ten times existing world population

Water quality monitoring is not yet developed in some countries, in other it is in decline. The quality of water available for drinking is posing a serious threat to the existence of life. Degradation of water quality is a consequence of human activities, land use practices and economic development. Land use practices affect the quality of water in our streams, lakes, ground water and ultimately the marine environment. Experience has shown that it is within our ability to slow and reverse water quality degradation, to improve human health and ecosystem integrity by nations putting forward a concerted effort. To accomplish this, aggressive, positive and timely policies and actions are needed. [10]

The apparent abundance of water is deceptive and is often taken for granted. There is a tendency to abuse and overuse it. This has led to water scarcity, for which the reasons are as follows, [11]

1. Increasing demand for water due to rapid increase in population.
2. Bad management: India receives the second highest amount of rainfall in the world, next to Brazil, almost 1150 mm, annually, draining a total volume of 400 million hectare meters. Of this, only 100 million hectare meters are retained in the soil. The rest is carried as run off into the oceans and seas.
3. Poor ground water resources due to deforestation and overgrazing which result in soil erosion and the inability of the soil to permit water infiltration.
4. Poor storage facilities
5. Over-exploitation of ground water in water scarce areas often resulting in the intrusion of saline water in coastal areas.
6. Dumping of various types of pollutants into water bodies, reducing the usability of the available water.
7. Cultivation of hybrid varieties of paddy, wheat, cotton, sugarcane and tobacco which consume more water.
8. Evaporational loss of water stored in large reservoirs and loss by seepage in long canal system.

9. Siltation of bodies of water due to denudation of the vegetational cover in the hills and catchment areas.

In India more than 10 mha out of 40 mha irrigated land has been affected by salinity and alkalinity. Water logged areas, counted as 'water-eroded lands are estimated to be about 74 mha out of India's total agricultural area of 143 mha. According to one government figure, most of 219 irrigated projects suffer from lack of drainage of land, and are thus contributing to soil and water degradation.

Not just does the issue of scarcity of water need to be addressed, but also the conservation of water also need to take place. Without these it is impossible for the survival of the ecosystem to take place and nature would be placed at an imbalance. The sustainability of global food production increasingly depends on efficient water use. In order to protect and maintain water sources necessary for agricultural, fisheries and agro forestry matters, water saving technology and management must be applied to all these types of activities.

One way by which preservation of water can take place is through the system of water resources management.

At present in India there is no central legislation by which water resource management can take place, but most of the states have legislation for their metropolitan by which water resource management can take place in those areas. Eg. Chennai Metropolitan Ground Water [Regulation] Act, 1987

Water Resources management is a very important issue with regard to the conservation and the protection of water. Water demand management is meant to manage the available water resources wisely and to deliver the necessary amount for sustainable development. In these include environmental conservation with inter and intra generation equity in mind while any policy of conservation is formulated. In pre-British India water management was essentially a local matter and was in the hands of the community. This changed with the advent of the British period and of modernity. Control over water resources passed from the hands of the community into those of the state. While ownership of natural resources was claimed by the state, management passed into the hands of engineers and bureaucrats. The induction to western engineering ushered in the era of large dams and there was a concomitant decline of traditional forms of small scale, local, community-managed systems of water harvesting and management. These new projects became symbols of development. Government initiatives for water resource management are outlined in *National Water Policy, 1987*, *National Conservation Strategy and Policy Statement on Environment and Development, 1992*, and *Policy Statement for Abatement of Pollution, 1992*. The strategy and policy statement prescribe command and control, technological zoning, fiscal incentives and use of economic instruments as mechanisms for water pollution control. The present approach to control water pollution in India is to use regularity

instruments along with systems for monitoring the prescribed standards to achieve the government's policy goals. This standards for ambient and point source discharges are set by various acts of the government. Compliance is mandatory and provisions for penalties are made in the acts. These are monitored by the central and state pollution control boards. A legal framework and occasionally fiscal incentive schemes for implementation and compliance of the standards support the regulatory approach. [12]

### **Rights in relation to Water [13]**

Right over any resource is not necessary when it is abundant and freely available. It applies to water also. However, certain control mechanisms were found necessary due to certain extreme conditions experienced by people. On the one hand, there were floods and the problem of heavy water logging and drainage; community participation was found necessary to save the human society from such natural disasters. On the other hand, there were droughts and water scarcity and so was the need for certain rules and regulations to use the available water more effectively, equitably and efficiently. Thus, in the process of development of a society, water has emerged as one of the most important natural resources to deal with for a better human living. Indeed, in the recent times, the increasing gap between demand and supply has resulted in several managerial problems such as allocation, maintenance, prioritizing use of water and need to resolve conflicts that may crop up in the process of sharing.

Conferring water right is an important measure or an institutionalized principle, which regulated water use and conflicts. All laws relating to water and other natural resources became necessary because of progress attained by human societies, which in turn brought demand for resources, scarcity conditions and problems of free riders; precisely because of these reasons, there was a need for informal rules and regulations; these have evolved over a long period time. These informal rules and regulations, which evolved over a long period time, reflected the socio-economic and political structure of society at any given point of time; These rules were not static but were subject to quite a good deal of changes; These changes were influenced by factors such as geo-physical and climatic conditions, socio-economic and political conditions and level of technological development.

Therefore, water rights are basically certain kind of institutional arrangements, which have evolved / emerged over a long period of time in the history of human settlement, in order to enable a society or a user-community to act, interact and to manage a system. This is not to glorify the irrigation institutions that existed in the past. Indeed, the kind of irrigation institutions that were controlled by kings or local chieftains was nothing but hydraulic despotism and reflected very much the local power structure and production relations at any given point of time. Nevertheless, there existed some organized and codified rules and regulations, customs, roles and mores, legislations, notifications etc., which not only defined access over water for a

community, but also subsumed all critical functions of water management. Given the local power structure unequal access to means of production, these institutions performed well in protecting the water rights of user communities. In the Indian context, the emergence of colonialism and formation of welfare state have not only altered the power relations but also have contributed to disintegration of these rights over natural resources, in particular water. At the same time, it is not to deny the wisdom that State has a key role in facilitating water use and in protecting the rights of user-communities. Further, in the context of present water rights debate, it is necessary to distinguish between rights acquired / gathered over time (riparian rights), and rights gained due to access to resources. Urban industrialists controlling water resources in the rural areas by sinking deep tube wells (much deeper than the existing ones in a village) is a classic case in support of rights gained due to control over resources.

### **2.3.3 Convention on Biodiversity [14]**

India has the intention to play a proactive role for thrashing out a legally binding pact on access to and benefit-sharing of biological resources. Being one of the world's 12 mega biodiversity centre, India has substantial stakes in both preserving the biodiversity and capitalizing on its commercial potential. The Biological Diversity Act came into force in 2002 and later in 2004 Biological Diversity Rules came into effect. Like some of the other environmental laws, the impetus and mandate for this law too springs up from an international convention, namely the Convention on Biological Diversity (CBD). The stated objectives of the CBD are: biodiversity conservation, sustainable use of biological resources, and equitable sharing of benefits arising from such use. One of the key aspects of the CBD is its policy and mandate with regard to Access to Genetic Resources. It has been argued that the agenda behind the CBD and its provisions on access was simply to legitimize access to and control of the genetic resources of gene-rich countries. The CBD recognizes that the State has sovereign rights over its biodiversity. For the purpose of law at the national level, provisions relating to access and benefit sharing in the CBD raise issues relating to property and use rights over land and things that grow on the lands. The law relating to property in India recognizes that things attached or rooted to the earth constitute immovable property. Though the Convention on Biological Diversity (CBD), signed under the aegis of the United Nations in 1992, provides for equitable sharing of benefits from the use of genetic resources and related knowledge, there are no legally binding rules to enforce these provisions. The Bonn convention, adopted by the Conference of the Parties (COP) to the CBD in 2002, lays down guidelines on access to genetic resources and fair and equitable sharing of benefits but these are not mandatory rules and remain only on paper.

Biological diversity, or biodiversity, is the variety of the world's organisms, including their genetic diversity and the assemblages they form. It is the blanket term for the natural biological wealth that undergirds human life and well-being. Biodiversity is our wealth, and a

vital means of sustenance, therefore, it is absolutely imperative to understand that this diversity must be conserved as a critically important attribute of nature.

1. The Biodiversity Act is enacted to provide an appropriate strategy for the conservation of biological diversity, sustainable use of its components & fair & equitable sharing of the benefits arising out of the use of biological resources, knowledge & for matters connected therewith or incidental thereto. Biological Diversity Act, 2002 highlights the following-
  - Enacted in pursuance of United Nations Convention on Biological Diversity, 1992.
  - Provides for conservation of biological diversity and sustainable use of its components.
  - Mandates fair and equitable sharing of benefits arising out of the use of biological resources and knowledge.
  - India's response to cases of bio-piracy.
  - Restrictions on use of biological resources not only by foreign nationals and entities but also on Indian entities having any non Indian participation in their share capital or management.
  - Restrictions on obtaining IPR for an invention based on research or information on a biological resource obtained from India. Prior approval of National Biodiversity Authority is required.

However, this task is unlikely to be easy. While India and most other developing countries are in favour of a binding pact on this vital issue, the developed countries, which are the major beneficiaries of lack of such an accord, are vehemently opposed to it. Apart from enacting the Biological Diversity Act, 2002, the National Biodiversity Authority and the Traditional Knowledge Digital Library have been set up for this purpose. Moreover, national bureaus (read gene banks) have also been created to preserve genetic resources relating to plants, animals, fish, insects and microbes. However, national action alone is limiting in the absence of a binding global pact.

## ***2.4 Legislations regarding different environmental issues***

### ***2.4.1 POLLUTION-Legislation and policies [15]***

Water Pollution- The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide guidance for the prevention and control of water pollution, and to maintain or restore wholesomeness of water in the country. The Act was amended in 1988. Same act was again enacted in 1977, to prop up for controlling the levy and collection of access on water consumed by persons operating and carrying on certain types of industrial activities. This access is controlled with a view to augment the

resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

The Water (Prevention and Control of Pollution) Act, 1974 includes the following-

- Prevention and control of water pollution.
- Establishment of boards / authorities at Central and State level, i.e., Central Pollution Control Board (CPCB), and State Pollution Control Boards (SPCBs) / Pollution Control Committees (PCCs).
- Mandates prior approval of SPCB / PCC for operating, establishing and expanding industrial activities leading to discharge of industrial effluents.
- Empowers SPCB / PCC to enter into industrial plants, factories, etc., and inspect plant, records registers and documents.
- Empowers SPCB / PCC to take samples of industrial effluents and analysis of same.
- Provides for Criminal liabilities.

#### **2.4.2 *FISHERY*-Legislation & policies [16]**

The Indian Fisheries Act of 1897 is still the fundamental legal act covering the whole territory of the Indian Confederation. It has been amended numerous times over the years to adjust the definition of the geographical territory covered by the Act, or by adding State-level local rules on the management of the fish resources (FAO 2011). In this Act following are the summits that should be kept in mind:

(1) "Fish" includes shell-fish:

(2) "Fixed engine" means any net, cage, trap or other contrivance for taking fish, fixed in the soil or made stationary in any other way: and there is strict erection and use of fixed engines

(3) "Private water" means water which is the exclusive property of any person or in which any person has for the time being an exclusive right of fishery whether as owner, lessee or in any other capacity.

(4) If any person uses any dynamite or other explosive substance in any water with intent thereby to catch or destroy any of the fish that may be therein, he shall be punishable with imprisonment for a term which may extend to two months, or with fine which may extend to two hundred rupees.

(5) The word "water" includes the sea within a distance of one marine league of the sea-coast: and an offence committed under that sub-section in such sea may be tried, punished and in all respects dealt with as if it had been committed on the land abutting on such coast.

(6) If any person puts any poison, lime or noxious material into any water with intent thereby to catch or destroy any fish he shall be punishable with imprisonment for a term which may extend to two months, or with fine which may extend to two hundred rupees.

(7) Rules may also prohibit all fishing in any specified water for a period not exceeding two years.

### **2.4.3 FORESTRY- Legislation and policies [17]**

The National Forest Policy (1988) is the primary policy statement related to forestry, which reflects the ethical standards on the natural environment enshrined in the Constitution. Forestry and the environment interface with many other sectors, which affect the forest and wildlife resources. The Constitution of India makes explicit reference to forest protection. State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country. Further, to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures is one of the important fundamental duties of every citizen. Under the constitution both the central and the state governments may legislate on issues related to forests and protection of wild animals and birds. The Constitution of India makes explicit reference to forest protection. State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country. The NFAP is a comprehensive long-term strategic plan for the next 20 years. It identifies the issues and programs for achieving sustainable forestry development in India by harmonizing the activities of different stakeholders. It identifies five programs: (1) protect existing forest resources, (2) improve forest productivity, (3) reduce total demand, (4) strengthen the policy and institutional framework and (5) expand the forest area. As resources are inadequate efforts are being made to mobilize resources both from external and internal sources for implementing the NFAP. The MOEF, with FAO and UNDP, organized a conference of international donors for this purpose. Some funds have been mobilized through discussions with interested donor agencies of developed countries. Some forestry policies controlled the diversion of forestland for non-forestry development in accordance with the principles of sustainable development by statutory provisions, which also include general guidelines for mitigate measures such as compensatory afforestation. Conversion of forestland to agriculture has been ruled out. The forest industries are encouraged to procure raw materials from non-forest areas. Affirmation of the national policy for people's participation in forest management is expressed in JFM, which emphasizes the creation of an enabling environment, empowerment and capacity building of village communities and local forestry officials. Trees Outside Forest (TOF) also play an important role in supporting rural economy and livelihoods as well as in environmental amelioration.

At present following acts deal with aspects relating to biodiversity:

- Indian Forest Act, 1927
- Wildlife (Protection) Act, 1972

- Forest (Conservation) Act, 1980

India Forest Act, 1927 and Forest (Conservation) Act, 1980 deal with management of forests and conservation of forestland respectively. Wildlife (Protection) Act, 1972 is for the protection of wild animals, birds and plants, and basically aims at protecting, propagating or developing wildlife or its environs through national parks, sanctuaries etc. In addition, the Act has a provision to prohibit picking and uprooting etc. of specified plants. This Act covers protection of flora and fauna in notified sanctuaries and national parks, six specified plants species and regulates hunting of animals specified in Schedules appended to the Act.

## ***2.5 Relevant socio-economic policies***

### **2.5.1 National economic development strategies [18]**

Economic development, achieved largely through productivity growth, is very important to both developed and developing nations. However, even though we know that higher productivity leads to improved economic outcomes (for example, higher income, more choices to the consumers, better quality products, etc.), there has been no consensus among researchers about either the desired path of development or the role of state in economic development. India's economic development strategy immediately after Independence was based primarily on the Mahalanobis model, which gave preference to the investment goods industries sector, with secondary importance accorded to the services and household goods sector. Among other things, this strategy involved canalization of resources into their most productive uses.<sup>4</sup> Investments were carried out both by the government and the private sector, with the government investing in strategic sectors (such as national defense) and also those sectors in which private capital would not be forthcoming because of lags or the size of investment required (such as infrastructure). The private sector was required to contribute to India's economic growth in ways envisaged by the government planners. Not only did the government determine where businesses could invest in terms of location, but it also identified what businesses could produce, what they could sell, and what prices they could charge. Thus the strategy of economic development in India meant (1) direct participation of the government in economic activities such as production and selling and (2) regulation of private sector economic activities through a complex system of controls.

Over time, India created a large number of government institutions to meet the objective of growth with equity. The size of the government grew substantially as it played an increasingly larger role in the economy in such areas as investment, production, retailing, and regulation of the private sector. For example, in the late 1950s and 1960s, the government established public sector enterprises in such areas as production and distribution of electricity, petroleum products, steel, coal, and engineering goods. In the late 1960s, it nationalized the banking and insurance sectors. To alleviate the shortages of food and other agricultural outputs, it provided modern agricultural inputs (for example farm machinery, irrigation, high yielding varieties of seeds,

chemical fertilizers) to farmers at highly subsidized prices (World Economic Indicators, 2001). In 1970, to increase foreign exchange earnings, it designated exports as a priority sector for active government help and established, among other things, a duty drawback system, programmes of assistance for market development, and 100 per cent export-oriented entities to help producers export (Government of India, 1984). Finally, from the late 1970s through the mid-1980s, India liberalized imports such that those not subject to licensing as a proportion to total imports grew from five per cent in 1980-1981 to about 30 per cent in 1987-1988. This active and dominant participation by the government in economic activities resulted in the creation of a protected, highly-regulated, public sector-dominated economic environment.

The economic development in India followed socialist-inspired policies for most of its independent history, including state-ownership of many sectors; extensive regulation and red tape known as "Licence Raj"; and isolation from the world economy. India's per capita income increased at only around 1% annualized rate in the three decades after Independence. Since the mid-1980s, India has slowly opened up its markets through economic liberalization. India's environment of regulated economic development led to the formulation of policies that were concerned with both macroeconomic and microeconomic aspects. Overall, there can be no doubt that the reforms implemented since 1991 have led to considerable economic progress in India.

For example, from 1992-1993 through 2000-2001, economic growth averaged an unprecedented 6.3 per cent per year. In the late 2000s, India's growth has reached 7.5%, which will double the average income in a decade. Analysts say that if India pushed more fundamental market reforms, it could sustain the rate and even reach the government's 2011 target of 10%

India ranks second worldwide in farm output. Agriculture and allied sectors like forestry, logging and fishing accounted for 18.6% of the GDP in 2005, employed 60% of the total workforce and despite a steady decline of its share in the GDP, is still the largest economic sector and plays a significant role in the overall socio-economic development of India. The required level of investment for the development of marketing, storage and cold storage infrastructure is estimated to be huge. The government has implemented various schemes to raise investment in marketing infrastructure. Among these schemes are *Construction of Rural Go downs*, *Market Research and Information Network*, and *Development / Strengthening of Agricultural Marketing Infrastructure, Grading and Standardization*.

The Indian Agricultural Research Institute (IARI), established in 1905, was responsible for the research leading to the "Indian Green Revolution" of the 1970s. The Indian Council of Agricultural Research (ICAR) is the apex body in kundiure and related allied fields, including research and education. The Union Minister of Agriculture is the President of the ICAR. The Indian Agricultural Statistics Research Institute develops new techniques for the design of

agricultural experiments, analyses data in agriculture, and specializes in statistical techniques for animal and plant breeding. Prof. M.S. Swaminathan is known as "Father of the Green Revolution" and heads the MS Swaminathan Research Foundation. He is known for his advocacy of environmentally sustainable agriculture and sustainable food security.

India is fourteenth in the world in factory output. Manufacturing sector in addition to mining, quarrying, electricity and gas together account for 27.6% of the GDP and employ 17% of the total workforce. Economic reforms introduced after 1991 brought foreign competition, led to privatisation of certain public sector industries, opened up sectors hitherto reserved for the public sector and led to an expansion in the production of fast-moving consumer goods. Post-liberalisation, the Indian private sector, which was usually run by oligopolies of old family firms and required political connections to prosper was faced with foreign competition, including the threat of cheaper Chinese imports. It has since handled the change by squeezing costs, revamping management, focusing on designing new products and relying on low labour costs and technology.

India is fifteenth in services output. Service industry employt English-speaking workers on the supply side and on the demand side, has increased demand from foreign consumers interested in India's service exports or those looking to outsource their operations. India's IT industry, despite contributing significantly to its balance of payments, accounts for only about 1% of the total GDP or 1/50th of the total services.

### **2.5.2 National agriculture Policy [19]**

The first ever National Agriculture Policy was announced on 28th July, 2000. The National Policy on Agriculture seeks to actualize the vast untapped growth potential of Indian agriculture, strengthen rural infrastructure to support faster agricultural development, promote value addition, accelerate the growth of agro business, create employment in rural areas, secure a fair standard of living for the farmers and agricultural workers and their families, discourage migration to urban areas and face the challenges arising out of economic liberalization and globalization. The policy seeks to promote technically sound, economically viable, environmentally non-degrading, and socially acceptable use of country's natural resources - land, water and genetic endowment to promote sustainable development of agriculture .The use of bio-technologies will be promoted by this policy for evolving plants which consume less water, are drought resistant, pest resistant, contain more nutrition, give higher yields and are environmentally safe. Balanced and conjunctive use of bio-mass, organic and inorganic fertilizers and controlled use of agro chemicals through integrated nutrients and pest management (INM & IPM) will be promoted. A major thrust will be given to development of rain fed and irrigated horticulture, floriculture, roots

and tubers, plantation crops, aromatic and medicinal plants, bee-keeping and sericulture for augmenting food supply, promoting exports and generating employment in the rural areas.

National Agricultural innovation project aims to facilitate the accelerated and sustainable transformation of Indian agriculture in support of poverty alleviation and income generation through collaborative development and application of agricultural innovations by the public organizations in partnership with farmers groups, the private sector and other stakeholders.

### **2.5.3 National energy policies<sup>2</sup>**

With high economic growth rates and over 15 percent of the world's population, India is a significant consumer of energy resources. In 2009, India was the fourth largest oil consumer in the world, after the United States, China, and Japan. Despite the global financial crisis, India's energy demand continues to rise. India lacks sufficient domestic energy resources and imports much of its growing energy requirements. In addition to pursuing domestic oil and gas exploration and production projects, India is also stepping up its natural gas imports, particularly through imports of liquefied natural gas.

India suffers from a severe shortage of electricity generation capacity. According to the World Bank, roughly 40 percent of residences in India are without electricity. The Government is aware of the low energy efficiency, and they have therefore passed the Energy Conservation Act from 2002 to improve efficiency standards.

Geothermal, solar, and wind power hold little importance in electric power generation in the country. However, the government would like the share of renewable energy in electricity production to increase.

The solutions to these problems is an increase of energy efficiency through the whole energy chain – from the use of energy resources to the production of electricity and the demand side, and increasing the electricity supply capacity based on national and local renewable energy resources.

In respect of the HighARCSs project the challenge is how the use of renewable energy can be implemented as a driver for the development of the livelihoods without decreasing the biodiversity. Five projects can be suggested: 1. Possibilities using improved solar cells with higher efficiency and lower costs. 2. Possibilities of using improved batteries with more capacity and lower costs. 3. Use of improved cooking stoves with a higher efficiency. 4. Using of small

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<sup>2</sup> <http://www.eia.doe.gov/cabs/India/pdf.pdf>

hydropower plants. 5. Establishing of a local electrical grid – evt. supplied by solar cells or hydropower plants.

These suggestions need policy regulation sustaining the implementation of the projects e.g. subsidy arrangements. Such arrangements should be discussed and developed in co-operation with the relevant stakeholders like CDHI, the inhabitants of the village and private producers of the technologies.

#### **2.5.4 Policies on poverty alleviation and sustainable livelihoods in India [20]**

The phenomenon of mass poverty in developing countries and its relationship to the development process has been the subject of intense study for the past two decades. As a result, a considerable consensus has emerged on a number of issues. The pessimistic view that the growth process in developing countries has the perverse effect of actually accentuating poverty commands far fewer followers today than it once did. It is now widely recognized that the process of growth in most countries, even if not as equitable as might be wished, has at least led to significant improvements in the conditions of living of the poor. However, it is also evident that in many countries the pace of improvement has been slow, and in general much below expectations.

Eradication of poverty in India is generally only considered to be a long-term goal. Poverty alleviation is expected to make better progress in the next 50 years than in the past, as a trickle-down effect of the growing middle class. Increasing stress on education, reservation of seats in government jobs and the increasing empowerment of women and the economically weaker sections of society, are also expected to contribute to the alleviation of poverty. It is incorrect to say that all poverty reduction programmes have failed. The growth of the middle class (which was virtually non-existent when India became a free nation in August 1947) indicates that economic prosperity has indeed been very impressive in India, but the distribution of wealth is not at all even.

Poverty eradication and growth of livelihood are two faces of one coin. Sustainable livelihoods refer to improvement of livelihoods of the poor people. The approach to achieve sustainable livelihood draws on the main factors that affect poor people's livelihoods and the typical relationships between these factors. It can be used in planning new development activities and in assessing the contribution that existing activities have made to sustaining livelihoods.

The two key components for achieving sustainable livelihoods are:

- a *framework* that helps in understanding the complexities of poverty
- a set of *principles* to guide action to address and overcome poverty

With proper implementation of sustainable livelihood measures poverty can be alleviated if not completely eradicated.

The most important step taken by the Indian Government to alleviate poverty and ensure employment was implementing the bill **NATIONAL RURAL EMPLOYMENT GUARANTEE Bill**, 2004 as an act in 2005 which has been now named after Mahatma Gandhi. [21]

According to the website of India Development Gateway (accessed 21-09-2011), The **National Rural Employment Guarantee Act (NREGA**, also known as **National Rural Employment Guarantee Scheme, NREGS**) is Indian legislation enacted on August 25, 2005. The NREGA provides a legal guarantee for one hundred days of employment in every financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage. The Ministry of Rural Development (MRD), Govt of India is monitoring the entire implementation of this scheme in association with state governments

This act was introduced with an aim of improving the purchasing power of the rural people, primarily semi or un-skilled work to people living below poverty line in rural India. It attempts to bridge the gap between the rich and poor in the country. Roughly one-third of the stipulated work force must be women.

Other than this some more salient steps are implemented considering the situation of poverty followed by livelihood conditions in India viz. National Food for Work programme, Swarnajayanti Gram Swarozgar Yojana, Sampoorna Grameen Rozgar Yojana, Indira Awas Yojana, Pradhan Mantri Gramodaya Yojana , Rural Employment Generation Programme , Prime Minister's Rozgar Yojana , Pradhan Mantri Gram Sadak Yojana, Antyodaya Anna Yojana, Swarna Jayanti Shahari Rozgar Yojana, Drought Prone Areas Programme, Desert Development Programme, Integrated Wastelands Development Programme and Valmiki Ambedkar Awas Yojana. [21]

## ***2.6 Summary: General context of governance system of aquatic resources in India***

India is a representative democracy organized as a federation of States. The legal framework for the management of aquatic resources in India is a complex set-up of Federal and local State level Acts and policy programmes. The main legal texts relevant for the HighARCS sites in Uttarakhand have been identified as being the Environmental Protection Act (1982), the Water (Prevention and Control of Pollution) Act (1974), the National Water Policy Act (1987), the Convention on Biodiversity (1992) with the corresponding Biodiversity Act (2002) . The study of the law texts provide a guide to identifying which government institutions are responsible for

enforcing the rules and policy objectives stipulated in the Acts. The Environmental Protection Act (1982), the Water (Prevention and Control of Pollution) Act (1974), The Air (Prevention and Control of Pollution) Act (1987), Wildlife Protection Act(1972), Forest Conservation Act(1980), Biological Diversity Act(2002) are enforced by the Ministry of Environment & Forests. MoEF enforces these rules to the regional authority of Uttarakhand directly. State has no role in enforcing these rules, as no State Rules have been enacted still now. (Commented by regional authority during field visit) [22]

The governance institutions responsible for the environmental policies in India work in a societal field where they relate to a number of other government institutions vested by policy interests from economic development (energy, industries, agriculture, forestry, fisheries), health, infrastructure, education etc., as well as social actors from the private sector, civil society and local communities.

In the following chapters, the main social actors and the specific legal and institutional situation of environmental management and socio-economic development in the Nainital Lake District will be analyzed.

### **3. POLICY-LEVEL DRIVERS AND PRESSURES ON THE STATE OF AQUATIC RESOURCES IN THE NAINITAL REGION**

#### ***3.1 The administrative structure of the Nainital Lake District*** [23]

The state of Uttarakhand earlier known as Uttaranchal came into existence on 9<sup>th</sup> November 2000 as 27<sup>th</sup> state of Republic of India. Before that it had been a part of the larger province of Uttar Pradesh. It is one of the few states in the country which is boasted with 2 Rajbhawans. 1 Rajbhawan is situated in Nainital. In the pre independence era, Nainital served as the summer capital of the United Province (Now known as Uttar Pradesh). Nainital is also authorized with same legal services of Uttarakhand. Nainital Udham Singh Nagar Lok Sabha Constituency is one of the 5 Lok Sabha Constituencies in Uttarakhand state in northern India which came into existence in 2008.

Nainital is one of the most important districts of Uttarakhand with high altitude. Around 60,000 people permanently reside in the catchment area of Nainital Lake today. The population density in the catchment is 12,766 person/km. About 5,00,000 (Lac<sup>3</sup>) tourists approximately visit the

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<sup>3</sup> The **South Asian numbering system**, used today in the Indian subcontinent (comprising India, Pakistan, Bangladesh and Nepal) is based on grouping by two decimal places, rather than the three decimal places commonplace in most parts of the world. ([http://en.wikipedia.org/wiki/Indian\\_numbering\\_system](http://en.wikipedia.org/wiki/Indian_numbering_system)).

town every year. Tourism has greatly contributed to the socio-economic condition of the region. Due to an increase in the permanent and floating population, developmental activities have expanded largely in the catchment areas. The pattern of land use especially, forest cover has been reduced in the last few years due to an increase in the rate of urbanization and other activities. The number of houses has also doubled in the last 30 years. The tourism industry has a strong linkage to socio-economic progress of the country while having a high capital ratio. It is estimated that Rs 1 million investments in tourism creates 47 direct jobs and 11 indirect jobs which is much higher than the potential of the primary and secondary sectors.

Nainital is an important administrative town in the State, containing the High Court and well known institutions such as Academy Of Administration, Aryabhata Research Institute of Observational Sciences (ARIES), Office of Kumaon Mandal Vikas Nigam and Kumaon University. It is also the Headquarter of Nainital Lake District and Kumaon region. Nainital, which was set up by the British way back in early 19th century as a summer resort became summer capital of the Northern Province. It has a proud privilege of being one of the oldest municipalities.

The Nainital Municipal Board was formally constituted in 1845. It was the second Municipal Board of North Western Provinces. In 1862, Nainital became the summer seat (i.e. to avoid the scorching heat of summer, the Government offices shifted temporarily to the colder part of the country) of the North Western Provinces. The town also became the summer seat of the Uttar Pradesh (U.P.) Government after independence. After 1963 the summer exodus of the U.P. Government was stopped. The Secretariat building is now being used by divisional and district offices. Currently, Rajbhawan is the official guest house for the governor of Uttarakhand and for visiting state guests.

There are a number of political parties active in the villages around Bhimtal and Naukuchiatal. Respondents reported that they could turn to political parties for support or advice in resolving conflicts. Bharatiya Janata Party (BJP) and Congress are primarily active in these villages. Samajwadi Party (SP) and Bahujan Samaj Party (BSP) are also present. Most people have very little access to political power. However, in terms of awareness of rights, men and women are aware of the places from where to take licenses for the livelihood activities and rule making bodies that are present in these places. They also know where to go for legal advice.

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1 lac/lakh= 100.000; 1 crore = 100 lacs = 10.000.000

### ***3.2 Policies of economic development in Uttarakhand [24]***

The existing Industrial Policy was framed in the back-drop of potentialities and expectations of the newly created State of Uttarakhand. The policy focused on the sectors where Uttarakhand has inherent advantages e.g., Tourism, Hydro-power, Floriculture, Agro and Food processing, Handloom, Khadi and Village Industries etc. The Hon'ble Prime Minister of India during his visit to Nainital in March 2002 announced that a special package of incentives would be given to promote Industrial Development in Uttarakhand to offset the constraints that hampered this process. The package was formally declared on 7th January 2003.

In the specific site of this research, i.e. Nainital, Bhimtal and Naukuchiatal in Uttarakhand mainly 5 industries (economic sectors) dominate over there.

#### **3.2.1 Policy on Tourism-**

Tourism opportunities provided by the lake have increased substantially over the last decade with growing numbers of visitors. Tourism is today the largest service industry in India, with a contribution of 6.23% to the national GDP and 8.78% of the total employment in India. India experiences more than 5 million annual foreign tourist arrivals and 562 million domestic tourist visits. The Ministry of Tourism is the most important agency for the development and promotion of tourism in India. [25]

Uttarakhand is a paradise for trekkers, adventure sports lovers, pilgrims, wild life enthusiast; regular tourists to honeymooners, with the bounty of beauty provided by nature, all forms of tourists can be satisfied. The major tourist spots here being Nainital, Kanatal, Chakouri, Kausani, Almora, Chamba, Mukteshwar, Pithoragarh, Lansdowne, Ranikhet. The other glaciers of Uttarakhand, a treat for trekkers are Bunderpuunch Glacier, Gangotri Glacier, Khatling Glacier, Doonagiri Glacier, Dokrani Glacier, Kaphini Glacier, Ralam Glacier and others. [26]

Some famous wildlife sanctuaries in Uttarakhand are Nanda Devi National Park, Corbett National Park, Rajaji National Park, Govind Wildlife Sanctuary, Binsar Wildlife Sanctuary, Askot Wildlife Sanctuary. These places have always been a destination for mountaineering, hiking and rock climbing in India. A recent development in adventure tourism in the region has been white water rafting and other adventures sports. Adventure sports of offer here are White Water River Rafting on Ganges at Rishikesh, Skiing at Auli, Camping, Angling and Paragliding at Dayara Bugiyal. Eco tourism, rural tourism has also found new grounds in many villages of the state. [27]

To cash in on this tourism trend, the Government is trying all measure to attract people from India as well as abroad. The State of Uttarakhand offers opportunities for development of tourism, infrastructure related activities and services.

- The State Government has set up Statutory Uttarakhand Tourism Board under the Chairmanship of the Hon'ble Minister of Tourism to function as an apex body for development of Tourism in the State. [28]
- A shelf of projects has been prepared through reputed consultants for development through the private sector. Further, such opportunities will be identified on a continuing basis. Various options for public – private partnership in the Tourism sector would be available.
- Tourism Industry has been accorded the status of a thrust in the State.
- 100% exemption on Entertainment tax will be allowed for all new Multiplex projects in the State for a period of three years.
- A detailed separate Tourism Policy has also been formulated under which:
  - New tourism units will be allowed rebate/deferment facility in respect of luxury tax for a period of five years from the date of commencement.
  - New Ropeways installed in the State will be exempt from payment of entertainment tax for a period of five years from commencement
  - New Amusement parks set up will be exempt from entertainment tax for a period of five years from the date of becoming fully operational.
- Have started helicopter services to Kedarnath for pilgrims.

The tourism boom has resulted in growth of a large number of hotels and resorts mushrooming in Nainital, Bhimtal and Naukuchiatal followed by livelihood opportunities. The lakes of Bhimtal and Naukuchiatal are part of the lake circuit tours organized from Nainital. However, unlike Nainital, people here come mainly for a day excursion and visit before returning to Nainital. For this reason, the tourism economy surrounding the Naukuchiatal and Bhimtal is less compared to Nainital.

Today, the tourism economy of the lake region is one of the primary factors differentiating livelihoods here from some of the more remote villages, where livelihoods are far more agriculture based. Since tourism enhancement is a major objective of the Government of Uttarakhand, it is of utmost importance that the present quality of the lake water is conserved.

### **3.2.2 Policies on energy and industrial development [29]**

The Uttarakhand government has industrial and power policy with a focus to attract investments in the hilly region of the state. Under the new industrial policy, the government has made special provision for creating private industrial estates at an area comprising only 2 acres of land. Earlier, such facility was extended to 30 acre-long industrial estates under the industrial policy announced in 2003. The then Chief Minister B C Khanduri also disclosed that the special package has been prepared for the hilly region under which special tax incentives would be given

to industries, setting up their units in the hills for a period of 10 years that would remain in force for a period of ten years beginning from April 1, 2008. Special incentives including rebate in power tariffs would be given to all those industries which set up their units in the hills. The government also has new power policy. Under the new power policy, the government has decided to give special focus on small hydro projects and involve village panchayats in building hydel projects up to 5 MW

Government of Uttarakhand has framed following four policies for developing new hydroelectric projects in the state: [30]

1. Policy on hydropower development by private sector in the state of Uttarakhand (up to 25 MW)
2. Policy on hydropower development by private sector in the state of Uttarakhand (25 MW to 100 MW)
3. Policy on hydropower development by private sector in the state of Uttarakhand (above 100 MW)
4. Policy for harnessing renewable energy sources in Uttarakhand with Private sector/community participation.

These policies aim at engaging the private sector in harnessing the suppressed hydroelectric potential in the state of Uttarakhand. Uttarakhand Jal Vidyut Nigam Limited (UJVNL), the state owned utility for power, is nodal agency for allotment of projects.

The hydrological study develops a water balance of the Lake Nainital to facilitate the utilization of its water in a planned and systematic manner. The lack of knowledge of input and output parameters such as subsurface inflow, use of lake water for domestic and industrial purposes, evaporation loss and leakage from lake including the outflow through sluice gates had created uncertainty in determining the availability of water in the lake. The study attempts to understand the behavior of the input and output parameters in detail by using both conventional and isotopic techniques.

Though water resource management is outsized field with numerous factors engulfing within it, in which a slight spark has been noticed in Uttarakhand but with proper assessment and management it can fling light on Nainital, the district of lake also as water is the mother of the district in every sense

### 3.2.3 Floriculture

Uttarakhand has almost all the different Agro-geo climatic zones which make it particularly conducive to commercial floriculture. The State Government will make efforts to develop this activity in a big way with a reference to both domestic and export markets and as means for creation of employment and income generation opportunities for farmers in the State.

- This Sector will be accorded Industry status.
- It is proposed to establish Floriculture Parks with common infrastructure facilities for sorting, pre-cooling, cold chain, processing, grading and packing/marketing facilities.
- Infrastructure by way of centres for development and supply high quality root stock and planting materials and collection and transportation network etc will be developed. The airstrips near Dehradun and Pantnagar will be expanded and strengthened to facilitate air lifting facilities in course of time.
- Efforts will be made to enlist the cooperation of institutions like the APEDA, NHB, MFPI for the development of projects and facilities for this sector. [31]

Nowadays a number of floriculture farms have mushroomed in the district due to its favorable climate for growing varieties of attractive flowers. Floriculture are becoming more significant; offering additional earning opportunities in Nainital, Bhimtal and Naukuchiatal. Unlike cereal production, altitudinal differences offer hill farmers some competitive advantages in vegetable and flower production. Although this is profitable, it requires a heavy investment of labour. This is mostly a household business, although some employ few outside workers. Floriculture is also done here by some households and one such poly house was found in Bhimtal. The owner said that the seedlings are in demand from throughout India. During a field visit a nursery named Palm Leaves Floritech is noticed in Bhimtal. The owner of the nursery is T. Shekhar Shukla and he lives in Kanpur. He appointed a boy who maintains all the tasks of the nursery. From him, we come to know that the seeds of flowers come from Holland, the soil and fertilizers they used for floriculture is provided from outside. They used to sale the seedlings mainly to nearby cities like Delhi, Bareilly, Lucknow etc. These are all seasonal flower plants and the main demands of these seedlings are from August to September or till Dewali for house decoration and for personal use mainly in Delhi. They transport the seedlings through a special van where facilities are arranged so that the seedlings remain fresh during the journey period. They supply 2500 seedlings approximately. There are almost 30 – 35 nurseries in this region. The cost of each seedlings is Rs. 15/- and there is huge scope of profit and so it can be concluded that this floriculture business has been flourished throughout the region since almost 5 years. The main plants produced here are Petonia, Gazania, Dock flower, Salvia, Panji, Tenthos, Bilga, Impatiense, Liliium, Degonia, Zinnia, Cyclamen, Vinca, Cineraria, Dahlia etc. [32]

Policies and activities related to floriculture will enhance this growing sector and it can flourish as a booming industry with a huge scope of earnings. It can be maintained and improvised by Department of Agriculture, Government of Uttarakhand.

### **3.2.4 Horticulture [33]**

There are various kinds of vegetables and fruits including orange, lemon, peach, plum, grape, banana, akhrot, pears, apricot, citrus fruits, kafal, strawberry and different species of medicinal plants are also there. Apple orchards are found mainly in Ramgarh Mukteshwar belt. Beside this Peach, Pears, Apricot, Citrus fruits, Kafal, Strawberry, Hills Banana grown in the hilly track, Lichi of Ramnagar makes Nainital a main fruit growing district. Tea plantation work is also in progress in the slopes of Niglat&Ghorakhal. In the middle Himalayan range we find Daruharidra(*Berberisaristata*), Timoor (*Zanthoxylumarmatum*), Manjishtha (*Rubiaccordifolia*), Sugandhabala (*Pavoniaodorata*), Samayava, Manduparna, Dhooplakkar, Talish(*Trifoliumtumens*), Devdaru (*Cedrusdeodara*), Padam (*Nelumbonucifera*), Vidhangabhed, Kakoli (*Roscoeaprocera*), Ksheerkakoli (*Roscoeasp.*), Lahsuniyaand many other plants which mostly grow naturally. This range has the potential to grow plants like Saffron, Vindhanga, and Ghrirkumari (Aloevera) and so on. Chemical fertilizers and manures both are used by the farmers to enrich the quality of the crops grown by them. The crops mostly depend on the rain but in some areas agriculture is done by irrigation, and the source of that water is lakes. Growing vegetables, fruits etc. are mainly done for self consumption as the land holding is very small. Market for fish and vegetables are mainly located in Haldwani which is very expensive. It is the main source of vegetables for the peoples residing in Nainital, Bhimtal and Naukuchiatal. So if the vegetables can be produced locally and if there is a scope of marketing the produced then it will be a profitable outcome for both the purpose i.e. self consumption by consuming it in a less price and earning through selling it in a well marked price.

### **3.2.5 Marketing support [34]**

In Uttarakhand not many industries have developed. The only industry here is “Aqua Mall” in Bhimtal. There are a number of candle making factories and candle shops all around Nainital and Bhimtal. However, most of the shops and goods available there are brought from cities like Delhi, Lucknow and sold here.

- Purchase and price preference in Government purchases shall be accorded to the SSIs located in Uttarakhand subject to quality norms.
- Prices at pre-trade tax level shall be reckoned for comparison while making Government purchases to provide an impetus to local Industry.
- Non-SSI units located at Uttarakhand shall also be given purchase preference in Government purchases with reference to units located outside the State.

- Marketing assistance will be provided to the Small Scale Enterprises through organization of buyer-seller meets, and facilitating participation in Trade Fairs etc.

### **3.2.6 Livelihood policies and poverty Alleviation in the Nainital region**

People who are below the poverty line have Below Poverty Line (BPL) cards which allow them to secure different benefits through the rationing system. One person interviewed by the HighARCS team has also built their house under the Indira Awas Yojana. People here are aware about the different benefits that they are entitled to from the Government; however, the local government has not done much for them. According to the people, the Government does not provide any help or any insurance benefits for them in case of any injury or accident. In spite of all these efforts one of the common complaints that the local people here made was that the Government including the Lake Development Authority (LDA) mainly focuses on Nainital region and as such the remaining lakes are neglected.

Implementation based on livelihood policies:

- As mentioned in Chapter 2, the National Rural Employment Scheme guarantees local people for 100 days of guaranteed wage employment. In Uttarakhand, local people are engaged in works as labourers in the construction work, boatmen, fish labourers and others.
- A large number of houses are built following the Indira Awas Yojana scheme where the local people are required to pay a nominal sum of money and the rest of the sum is paid by the Government under this scheme.
- Following the Pradhan Mantri Gramodaya Yojana scheme, electricity connection has been given to almost all the households. This has led to an increase in the studying opportunity for the students. Also because of electricity connection there has been a surge in the number of televisions and mobile phone connection at households.

Also irrigation facility has developed in these regions. For agriculture this irrigation facility has been helpful. All these developments have taken place under this Pradhan Mantrak Gramodyaya Yojana scheme. [35]

The Kisan Bank which has been instituted a year ago in Uttarakhand has facilitated farmers to achieve their desired aims and progress. Kisan Bank can be termed as a single window institution catering to the needs of farmers. It helps the tillers to buy various inputs like quality seeds, fertilizers and farm equipments. The most remarkable aspect of the bank is that the financial support advanced to the farmers is recovered not just monetarily, but in the form the farm

produce. Thus, the farmers are saved from becoming victims of the vicious market trends and speculative traders. The Kisan Bank channelizes the sale of the farmers' produce. The bank also counsels the farmers about the technical aspects in agriculture which is environmentally approving too. [36]

Various rural schemes being operational under the Panchayati Raj system are making a difference in the lives of BPL (below poverty line) families across Uttarakhand.

Through National Rural Employment Guarantee Scheme Act, the Indira Awaas Yojna and Swaran Jayanti Gram Swarozgar Yojna, in particular, a large number of needy people here are getting benefited here. In the year of 2008, on April 1, the National Rural Guarantee Scheme was started here under which 3,752 workers were distributed Job Card and about 2,300 individuals bank accounts were opened. Presently, the workers are getting employment at their villages. The BPL families in the Block are also enjoying benefits under the Indira Awaas Yojna, which is meant to help construction of dwelling units by members of Scheduled Castes/ Schedule Tribes, freed bonded labourers and also non- SC/ST rural poor below the poverty line by providing them with grant-in-aid.

Under the Indira Awaas Yojna, people used to get a grant of Rs.27,500 an amount which has been now increased to 38,500 for benefiting the needy. About 230 families here have received grant for pucca houses in the last three years whereas 103 families were supported for constructing hatched houses. The Centre is also extending support to the needy families in villages through grants under Swaran Jayanti Swarozgar Yojna. Under this scheme, the beneficiary gets 25 per cent subsidy which has enabled many families to be on their own in life. Besides, under this scheme, 130 women groups have also been formed of which 81 groups have been given grants.

There have been lots of benefits for the villagers from the schemes. For example- the rural employment scheme, this scheme is helping the unemployed youth who used to go out in search of jobs. But now they can stay back and work here, Around 3.6 million more households benefited in the second phase and another 2.7 million households in the third phase of the implementation of the scheme. According to a data, 49 per cent women, 30 per cent Scheduled Castes and 25 per cent Scheduled Tribes have benefited by the scheme so far. Further, the government proposes to reach out to more than 40 million households under its flagship programme till the end of March in the current financial year. [37]

### ***3.3 The role of market institutions***

#### **3.3.1 Fish markets [38]**

The degree to which aquatic dependent activities are market oriented is highly variable. Fishing for example, is not commercialized. The fishes caught in the lakes are very limited. In fact the fishing is totally banned in Nainital to conserve the biodiversity and in Bhimtal fishing is done with restrictions imposed by Fisheries Department, Bhimtal (Nainital district) i.e. the amount of fishing that can be done is 4kg per persons per day. Fisheries Department, Bhimtal (Nainital district) issue licenses for fishing and angling for Bhimtal and Naukuchiatal. In Naukuchiatal fishing is also done with limitations. Commercial fishing is not done there. Local people used to catch fish for their consumption purpose. But for this they also face some problems due to degraded water quality. As a result fishes are settled at the bottom of the lake. So for the purpose of fishing big nets are required which is only owned by Fisheries Department, Bhimtal (Nainital district). So the Department often catch fish using big nets and they then sell it to the local people according to number of fishes available during catching. Since the fishes caught per day is so low the question of going to market does not arise. Whatever fish are caught with the intention of selling is sold at the lake-side. The Fisheries Department, Bhimtal (Nainital district) prevents over fishing. According to the Fisheries Department, Bhimtal (Nainital district), during peak season, there is regular monitoring by the officers of the department. However, no cases of illegal fishing are reported in any sites.

At that time, they hire fishermen in return for a wage to catch fish. The fishes which are caught are given to the Nagar Palika who distributes them at a fixed rate to other people. The labourers cannot reach the market directly. At times the catches which arise are sold to the local hotels and restaurants. In Haldwani there are fish as well as vegetables markets. The richer households are engaged in different types of businesses like garment shop so they have a market for these goods where these are sold. Also there is the local Bhutia Market and markets around the lakesides. Since large number of tourists visits these places throughout the year, the market for different goods is huge. Tourists frequently flock to these markets to purchase various gift items, woolen garments and other goods.

Livelihoods on the whole however, are becoming more dependent on the market. The era of rapid and intensive development of the Himalayan Region began two decades back when top priority was given to connect these areas with the plains by constructing roads. After the main roads were constructed the construction of link roads started, which continues even now and is likely to continue until each village is linked with a main road. Construction of these main roads has brought about an end of the subsistence village economy and replacement it with a money and market economy. Earlier, in villages along the roadsides, a few shops existed earlier to supply salt, oil, jiggery and cloth. The barter economy has been replaced now however, with the

money economy in which the villagers exchange products as both sellers and purchasers. The villagers are now compelled to sell their valuable products such as milk and ghee, and to adopt various means to earn money to satisfy their ever increasing demands. If the households produce more than their subsistence requirements then they sell that in the market. Surplus agricultural products are also sold by some large households but for most of the households these products are mainly produced for self consumption. A few coping households however take loans from their relatives in times of need such as during marriage or if someone is ill.

### **3.3.2 Markets for agricultural cashcrops [39]**

In Nainital there is no agricultural land as it is totally an urban area. However, in Bhimtal and Naukuchiatal people have some amount of agricultural land. These agricultural lands are mainly for producing vegetables, fruits and other crops by the families for self consumption. So there is little or no marketing of the agricultural goods. Outputs from agriculture such as crops and vegetables and animal husbandry cannot be sold in the market because the holdings are very small and is sufficient just to meet their consumption requirement. Women play a very prominent role in agriculture and animal husbandry in these areas.

Thus, if agriculture could be enhanced by producing more output then the surplus beyond the consumption could be marketed. Moreover, vegetables mainly come from Haldwani and the local markets are expensive. So if vegetables are produced locally and marketed then that problem could be solved. It can be implemented by the Department of Agriculture, Government of Uttarakhand.

## **4. MAIN PRESSURES AND MANAGEMENT PROBLEMS OF AQUATIC RESOURCES IN THE NAINITAL LAKE DISTRICT**

### ***4.1 On problems of degradation of ecosystems***

The environment is a concept of wholeness (nature), with non-living and living components are interdependent among themselves. It has been aptly defined as “the sum total of all the conditions and influences that effect the life and development of organisms”. This comprehensive definition stresses totality, and every living organism from the lowest to the highest, including human being, has its own environment. Studies have shown that the perspectives of ecology are different from those of economics in that the former stresses limits rather than continuous growth, stability rather than continuous ‘development’. The ecosystem is the basic unit which has biotic and abiotic components that form an interrelated, interconnected and interdependent system. The most important characteristic of an ecosystem is that it is dynamic, evolving and auto-sustainable as long as it remains reasonably undisturbed and there is incoming sunlight. The ecosystem provides

various services or benefits to the people. These are provisioning, regulating, supporting and cultural services.

The equilibrium of an ecosystem is disturbed by external stimuli such as natural cataclysmic changes and ever-increasing human activities dictated by socio-economic growth. The basic difference is that the socio-economic system, in contrast, is hitched only to one species, human beings. In an ecosystem, different species of plants and animals including human beings and micro-organisms form an interacting system. Thus, the economic process is unidirectional and human beings can only progress forwards. Conflict between the ecosystem and the socio-economic system arises from unidirectional and unlimited human wants to meet genuine needs as also greed. This has caused ecological crisis, which in other words means human exploitation of resources at a greater rate than can be normally regenerated under natural conditions.

The same logic can be applied to Nainital. In Nainital Lake, the socio-economic development with tourism, increasing population and urban expansion has given rise to the following management issues of aquatic resources:

#### **4.1.1 Eutrophication [40]**

The level of oxygen in the *hypolimnic layer* (the bottom, colder, stagnant, and constant temperature layer) is much lower than is required to sustain fish—and this is mostly due to pollution, which includes illegal dumping of garbage. The problem gets exacerbated during winters when the polluted and nearly *anoxic* (i.e. lacking oxygen) water from the bottom moves up to the surface on account of the lower temperature of the surface water. Fish die due to low oxygen content in this altered surface water. According to Rakesh Kumar, once District Magistrate of Nainital, "The main problem is trying to syphon off the water from the hypolimnic layer, 6 m (20 ft) from the bottom of the lake. Once that is done, we can increase the oxygen content in the lake using aeration methods. That is the only permanent solution."

The local environmental group in Nainital started a project to examine the level of the BOD (biological oxygen demand) of the lake water. Anaerobic digestion of lake sediments is a much slower process than with aerobic digestion. Where aerobic digestion can result in the control or reduction of organic sediment levels, anaerobic digestion almost always allows organic sediments levels to increase. During anaerobic digestion, bacterial enzymes and lack of oxygen make the nutrients in the bottom sediments soluble. Then the nutrients return to the water column and are available to support new weed and algae growth. Anaerobic conditions at the lake bottom have a damaging effect on the food chain that supports fish populations as well as reducing or eliminating fish habitat, ultimately resulting in a reduction of the fish quality, size and quantity.

### 4.1.2 Deforestation [41]

The forest has gone away from the villages. It is reported that there is a scarcity of fuel, fodder and fruit. Medicinal herbs are going to be extinct. One aspect of the deteriorating forest ecology is the large-scale replacement of natural forests by the plantation of only commercially profitable trees. These man-made forests are not capable of working in the same way as the natural forests for maintaining the ecological balance.

Fire also damages the forest area and there are different reasons of firing:

***Intentional fire:*** The forest is often set on fire by the villagers during the summer season to get a good growth of grass following the rains. The fire burns the debris that is lying on the forest floor and hence the grass is able to grow well in the rainy season. Sometimes it spreads and destroys vast tracts of valuable trees. The forest is also set a fire by the forest Department to clear it of dry vegetation in order to avoid the risk of a huge fire. Firing is done from top to bottom by cutting fire-lines at regular intervals to control the fire. Villagers also set fire to pine leaves falling on the surface as they inhibit the undergrowth.

***Accidental fire:*** Fire is also caused by man's carelessness. Unextinguished campfires of trekkers and picnickers, forest labourers throwing away burning cigarettes, bidis and matchsticks, villagers burning the unwanted material on their fields during summer, throwing away of torches used by travellers to see their way in the forest at night, and acid applied to increase the yield of resin. This acid may be spilled on the dry needles of a pine forest, thereby leading to forest fires.

### 4.1.3 Overexploitation of fish species [42]

Overexploitation of species affects the loss of genetic diversity and the loss in the relative species abundance of both individual and /or groups of interacting species. Nainital's population as reported by the Census-2001 was little over 38 thousand, which has since then grown, as reported, to 44 thousands, which at least doubles during tourist seasons. In 2003, the floating (mostly tourist) population of Nainital was 4.24 lakhs, which increased to 5.18 lakhs by 2005, recording an increase of 22% over a period of three years. Most of the tourists (floating population) visit this town in the three summer months. With increasing inflow of tourists and urban waste making its way into it, Naini Lake's water quality has been deteriorating alarmingly. Tourism has negative as well as positive impacts on mountain environment. With tourism there is destruction of forests for energy, fauna due to poaching and grazing lands due to camping activities. It leads to various kinds of pollution like air,

water and noise pollution. Tourism gives way to throwaway mentality, congestion and hygiene problems etc. Less awareness of tourist is mainly noticed in Bhimtal and Naukuchiatal. Over-fishing causes change in the genetic structure of fish populations due to loss of some alleles. The catching rate of fishes has increased in such a faster rate that to impede fishing, restriction was imposed on Nainital. The Lake Development Authority has authorized the Pantnagar University to formulate decisions regarding the cultivation and catching of fish. Due to over extracting of fishes, the University has decided to ban the fishing activities in Nainital. But without their concern illegal fishing activities is commonly found. In Bhimtal, fishing is done followed by some restrictions. Fishes are caught up to 4kg per person per day. This limit is maintained throughout the year by the fishermen. In Naukuchiatal due to degrading water quality fishing is not a common scenario. Other than the quality, there is a gap between management. Same management head is in charge of fishing in Naukuchiatal and Bhimtal. So there is lack of balance between management of Bhimtal and Naukuchiatal. As a result of all these, genetic diversity gets reduced.

#### **4.1.4 Physical modification of habitats [43]**

Physical modification of habitat may lead to species extinction. This is mainly caused due to damming, deforestation, diversion of water for irrigation and conversion of the small water bodies for other purposes. Construction of dams on river impedes upstream migration of fishes into the lake and displaces populations from their normal spawning grounds and separates the population in two smaller groups. Water has been diverted for irrigation to Bilaspur through channels mainly during summer i.e. in May- June. During summer, the lake water usually dried up but with water extraction during that period creates more pressure. To balance the quantity and level no actions have been taken. Again lake water during summer is channelized to Haldwani for drinking purpose through deep tube wells, for agriculture and irrigation purpose. The lake water is released for irrigation in the low lying regions this reduces the lake water to some extent. The source of inflow of water then also depends on rainfall and spring. Nothing steps are taken to refill the water. Hill cutting and destruction of forest is going on in catchment area of lake and in Naini Hill especially due to construction of buildings. Construction work and the incessant resale of land have had a derogatory impact on these areas. According to men in focus group discussions, the number of tourists is increasing owing to the attraction of the lakes. However, it is increasing the number of guest houses and it is reducing the area for cultivation. The local people cut trees on hills and so the soil becomes loose and this leads to landslides. And because of this the soil run off along with rain water and gets stored in the lake. So the depth of the lake is decreasing. Deforestation leads to catchment area degradation due to soil erosion which results into sedimentation and siltation. Existence of silted piece of land is found in Bhimtal. Ecologists feel that if nothing was done to prevent this siltation then the lake will dry up. For this mainly the natural habitat suffers. According to Census 2001, the forest cover area

was 35,394 sq. km in 2001 but in 2007 it reduces to 24,495 sq. km. This not only affect the wildlife and the breeding ground of aquatic organisms but cause gill clogging of small fishes also. People are burning forest in order to find grass for their animals, something which is detrimental for the environment. Not only water but soil and air are also being polluted due to indiscriminate cutting of trees, forest fires, use of pesticides for agricultural activities and smoke from burning fuel. The local people interviewed by the HighARCS team express the opinion that the maintenance of the lake is very less. They hope that the government and the boat union are doing good to protect the lake for better. For the sake of the record, it should be mentioned that the very small boys interviewed during focus group meetings are not aware of the environmental problems and its impact on the lakes.

#### **4.1.5 Pollution [44]**

The environmental degradation has taken place, inter alia, because of increase in pollution, over-grazing, lopping and hacking of oak forests, forests fires, landslides, encroachment, quarrying etc. The pollution in the lake is because of both inorganic and organic causes. As mentioned above, study has shown that lake water is rich in nutrients which support growth of many aquatic macrophytes and algal blooms.

Discharge of untreated waste water, disposal of solid waste and silt deposition are the major factors that cause pollution of the lakes. But the most potent source of pollution is human faeces from leaking sewers. The throwing of plastic bags and dumping of other material have added to the throes of the lake. From inspection it was found that the lake has turned dark green with an oily surface and is now full of dirt, human faeces, horse dung, paper polythene bags and all sorts of other waste. Plastic bottles and plastic packets are thrown away into the lakes and all these are obstructing the free flow of the fresh water in the lakes. These suspended solids affect the respiratory processes and secretion of protective mucus making the fish susceptible to infection of various pathogens. Polythene bags are prohibited in Nainital and there are also propositions to ban them in Bhimtal. Most of the sewer lines which leak ultimately discharge the faecal matter into the lake through the drains which open into it. The Commissioner also found that wherever the drains open at the shores of the lake, big heaps of rubble used in construction of the buildings is collected and these materials ultimately settle down on the shores of the lake thereby reducing the length, depth and width of the lake, besides polluting the water to a great extent. The lake water was found full of human waste and horse dung and other wastes, as already noted. The horse stand having been allowed to be erected near the lake and trotting around the lake being permissible, the report states that horse dung in abundance enters and reaches the lake. The tourists who enjoy boating in the lake throw left over edibles and polythene-bags in the lake though some bins are present in the lake side. This lake of Nainital is connected to 62 drains out of which 23 drains directly fall into the lake and whole lake is polluted because of this. The

discharge of sewage into the lake has also adversely affected the water ecology. They cause deoxygenation due to eutrophication causing mortality in fishes. Washing of clothes and bathing in the lake is also making the lake water very unclean. In a bid to conserve the water body, the residents have now switched on to scientifically designed garbage disposal system. Under the project named 'Mission Butterfly', the sweepers collect waste from each and every household and then directly transfer it to the compost pits where it is converted to manure.

The report [44] states about plying of heavy vehicles like buses on the Mall Road and the bridle paths. The growing traffic, with the growth of the town and big turnout of tourists, has contributed much to the environmental pollution. The increased traffic has in its wake brought noise pollution. They also enter Malli Tall and Talli Tal Bazaars causing noise pollution. The number of tourists, and with them the number of vehicles entering the town, is rapidly increasing and this, if not checked, could turn Nainital into a disfigured and despoiled town.

Bhimtal and Naukuchiatal have moderate levels of nutrients. The lakes have high rates of sedimentation, Bhimtal with 4.70 mm/yr, Naukuchiatal with 3.72 mm/yr, resulted in less adsorption of heavy metals, leading to their depletion in the bed sediments of the lake. Agricultural runoff and pesticides for agricultural activities also pollutes the water of Naukuchiatal and Bhimtal as agricultural practices are common there.

Besides, according to the quoted report [44], water is contaminated with metals like Cr, Cu, Fe, Mn, Ni, Pb and Zn. Concentration of some of them like Fe, Pb and Ni were higher than the recommended maximum permissible limits. Concentration of these metals was also found high in lake sediments. The level of metals amongst various components of lake varied considerably in different season. Plants and algae growing therein accumulated appreciable amount of metals and water roots of *Salix* being more efficient than others. High metal removing potential of these plants may be significant for biomonitoring studies and could be a useful phytoremediation technology to restore water quality by harvesting submerged and floating biomass inhabiting littoral zone of the lake.

#### **4.1.6 Climate change [45]**

The Fisheries Department, Bhimtal (Nainital district) has a view that there are clear warnings of plodding climatic change in these hilly areas. There is evidence that the major glaciers located in the Uttarakhand Himalayas are thinning at a hasty rate due to the swelling manners in the atmospheric temperature. Furthermore, year by year the snowline is observed to be retreating to higher. Most of the areas In Uttarakhand were known for eye-catching snowfall during winters (December to March), although they rarely receive snowfall nowadays. Owing to the effect of the gradual change in climate, the farming calendar has had to be shifted. Most of the resort and

hotel owners and restaurant owners believe that the local environment has changed a lot in the past few years. According to them, tourists used to throng to Nainital for snow and to break out the sweltering heat of the plains, but the scenarios have changed a lot. The warmer weather pushed Nainital in such a phase that it was left with no snow in the past two years. Because of deforestation the rainfall has decreased in these areas and it has also resulted in soil erosion. Global warming has changed the cycle of the seasons and while because of less rainfall; the amount of lake water is decreasing day by day. The renowned apple orchards located at Ramgarh, Munsyari and other locations at similar altitudes, are deteriorating due to an insufficient chilling period required for the crop.

#### **4.1.7 Fishing [45]**

As far as fisheries are concerned presently it is under anthropogenic stress. The aquatic resources are under the threat of habitat destruction, lesser flow in the rivers and mounting silt load. The cold water fisheries are known for their sensitivity and this is the best indicator of the aquatic habitats. Most of the species have narrow thermal tolerance and as such the increase in temperature is dangerous for their survival.

#### **4.1.8 Natural disasters (landslides, flooding) [46]**

The nature's beauty has been shackened up by some natural disasters also. There was a severe landslide in 1880 on the 14<sup>th</sup> September, following high monsoon rains. This cost the lives of 151 people. In July 1867, a part of the hill above the west end of the main bazaar in Mallital came down. This is the first recorded major landslide of Nainital. The next was on Sept.18, 1880 near the Alma Hill on the Sher-Ka-Danda ridge. The catastrophe of a few seconds took the toll of 151 dead and missing. The last of the landslides of the 19th century was on 17th August 1898 when a large chunk of Kailakhan ridge slid down into the Ballia ravine above the brewery.

After cloudbursts and landslides on September 21st, 2010 at least 76 people have died and several still missing in Uttarakhand. Almora, Chamauli, Uttarkashi and Nainital were the worst hit, with more than 25 homes being washed away.

## **5. Current responses**

### ***5.1 The organization of the local administration at the Nainital Lake sites [47]***

Nainital Nagar Palika Parishad (NNPP) is the urban local authority for the town of Nainital. Surrounded by Himalayan ranges as it is, tourists in their thousands visit the city annually,

especially in the summer months. Given its special characteristics, Nainital's civic administration or urban planning needs to be sharply distinguished from conventional city planning and administration where the city's urban space has a fairly settled population, although swollen by occasional arrival of some floating population. Nainital's population as reported by the Census-2001 was little over 38 thousand, which has since then grown, as reported, to 44 thousands, which at least doubles during tourist seasons. To cope with the unusual situation of seasonal ingress and egress of large populations, Nainital Nagar Palika Parishad (NNPP) has to constantly 'network' with a number of organizations and agencies. In other words, Nainital civic administration has to be constantly prepared to meet seasonal, anticipated 'emergencies' in addition to meeting the 'normal' civic needs of the city. Keeping the broad JNNURM guidelines in view, the institutional profile of Nainital is presented in some detail below. Broadly, the institutions involved in infrastructure/service provision in the city are: [48]

- i. Nainital Municipal Council (NNPP)
- ii. Nainital-Lake-Region Special Area Development Authority (NLRSA)
- iii. Uttarakhand Pwajal Nigam
- iv. Uttarakhand Jal Sansthan
- v. Public Works Department
- vi. Regional Transport Office
- vii. Uttarakhand State Electricity Board
- viii. Uttarakhand State Environment Protection and Pollution Control Board
- ix. Uttarakhand State Urban Development Agency
- x. Uttarakhand Transport Authority

Besides these, State's field administration, particularly District Administration headed by the District Magistrate (DM), the Divisional Commissioner (DC), and 'heads' of functional departments such as the Executive Engineer and the Superintending Engineer are closely associated with some aspect of city administration. Various state-level agencies are operating here and are responsible for some of the major infrastructure and service provisions of the city. The responsibility often is limited to the planning, designing and execution of projects, which are then transferred to the agencies directly responsible for the operation of infrastructure facilities.

Cold Water Fisheries Department, Bhimtal (Nainital district) has the accountability to maintain the biodiversity of the Bhimtal Lake. This department have experimented different kinds of mutation of different species in the Bhimtal lake water with the aim to maintain the biodiversity. So, it can be said that this department becomes the direct stakeholder of the lakes.

The "Nainital Jheel Parikshetra Vishesh Kshetra Vikas Pradhikaran" could function better in a limited role as a promoter and a facilitator for developmental and commercial activities with

jurisdiction extended to cover all four lakes in the district, as at present a plethora of organizations are functioning in the notified area such as Nainital Nagar Palika Parishad, Jal Nigam, Irrigation Department, Power Corporation, Forest Department and Fisheries Department, Bhimtal (Nainital district) who are directly involved with the lake.

To address the issue of unplanned growth of Nainital and pollution in the lake and its catchment area the Government of Uttar Pradesh constituted a National Lake Region Special Area Development Authority (NLRSA) or Lake Development Authority in 1984 as it is officially called - is the planning and development authority for Nainital lake region area. It comprises of five planning zones Nainital, Bhawali, Mehragaon (khas), Bhimtal (including Sattal) and Naukuchiatal. This authority shoulders the responsibility of preparing and enforcing the development plans for lake conservation.

Lake Development Authority (LDA) is in charge for monitoring all the lakes in this Kumaon Region. Three lakes Nainital, Bhimtal and Naukuchiatal, taken for HighARCS research also falls under the monitoring of LDA. So, among the direct stakeholders LDA is one of the significant stakeholders.

In addition a number of committees were appointed from time to time, the latest being the Brajendra Sahay Committee by the Uttar Pradesh Government (1994-1995). It is heartening that the local community is aware of the problems of the lake. A noteworthy step in this direction has been the voluntary banning of plastic bags by the association of local traders. [49]

## ***5.2 Environmental regulatory measures engaged by different institutions***

For pursuing all the different livelihood activities like fishing, boating, hotels, restaurants, shops it is necessary for the stakeholders to take license. There are certain rules and regulations for pursuing these activities. Respective government departments make the rules. However, general people do not have any influence on the rule making process. These rules also change over time. Almost 30 years before there was no ban to carry out fishing in the lakes.

LDA is a state undertaking sector not directly a Govt. organization. It is an administrative sector of Govt. Awas bibhag is the head office situated in the capital of Uttaranchal. LDA is actually authorized as Natural lake region special area development authority which is set up at 1989 and it is not a lake development authority, it is a regulatory body. Their work is basically to regulate the rules and acts of the lake region. They are not responsible for the development of lakes. Govt. has assigned a project to LDA for the maintenance of 5 lakes of Nainital District i.e. Nainital, Bhimtal, Naukuchiatal, Sattal and Khuruptal. The main task of the project is regulation and maintenance of the lake region. For LDA, the maintenance work is not mandatory but according to the lake conservation programme, the project which is sanctioned has assigned LDA as a nodal agency. For that reason only, they have to maintain and conserve the lake but according to

C.M. Saha, Project Engineer of LDA, may be after the project is done they may not be involved for the conservation of lake.

Under National lake conservation programme, 2 separate projects have been undertaken, one for Nainital and another for the rest of the 4 lakes. The main reason for the division is, in 2001, the prime minister of our country, Mr. Atal Behari Bajpai visited Nainital and the factors were looked by him. At that time the position of Nainital lake is deteriorating. Some cases and petition were also filed in High Court. The PM gives more priority to Nainital lake as the BOD was more than 30 and the depth of Nainital lake was 27 meter hypolimnic layer was 19 meter. But during the time of preparation of DPR, central govt. included the other 4 lakes in this project though there are no such problems in the lakes. This existing project is for 3 years which is completed. But LDA with its own fund is maintaining the lake. Central is no more involved in the maintenance of the lake. State is providing the fund. But for aeration project, proposal is sent to the state govt. In outside catchment area, work regarding sewage, sanitation, cleaning has been done. Inside the lake the main work involves desiltation, BOD maintenance, aeration work, water quality maintenance.

The revenue generated by collecting toll tax goes to NNPP though the nodal agency is LDA. Not only has the toll tax, but also revenue generated by other tax related to lake, lake ownership, boating license goes to NNPP. No resource has been provided to LDA though the management of NNPP is decreasing according to LDA.

The rules and regulation were implemented by the project monitoring committee and the rules, acts and regulation were same as the other regulatory committee. The head of the project monitoring committee is the Chief Secretary. The local head is Kumaon Commissioner, the advisory committee comprised of politicians, MP, MLA. To solve issues meetings were held by all of them. Some employment and livelihood improvement programmes were also implemented. Under awareness programme, Lake Warden scheme was implemented. Boys and girls of NCC were involved for this work. They have been empowered for this work round the lake with ID cards for each of them. Mainly they look after the sanitation facilities of the region. Local people and tourists disobeying the rules are penalized by these boys and girls with penalty of Rs. 250/-. When this act moves under NNPP they increase the penalty charge to Rs. 1000/-. If then also not maintained by locals and tourists then cases are filed against them. In the surrounding region of the lake, people are not permitted to take any eatables only they can carry water bottles with them. NNPP now is trying to implement rules and regulation to clean the surrounding and to conserve the lake region. Under LDA, Mission Butterfly a renowned project was started many years back for the purpose of solid waste management. They have kept green and blue bucket in the whole Nainital for the purpose of sewage and garbage disposal. The green bucket is used for the dry waste and the blue bucket is used for wet waste. They have not separated the composting

one and decomposing one but they have a STP in Narayannagar where they do the composting of sewage and garbage. Mainly wet waste composting is done in Narayannagar. The dry waste is segregated in a recycling plant situated in Haldwani. The total Nainital is clustered into 40 cluster and in each cluster there are 200-250 houses. Rs. 25/- is collected from each of the house for collecting the sewage. In this project they have 1 secretary, 1 chairman, 1 finance manager and other members which are part of NNPP Sachhadan Samity. They employ people to collect sewage and garbage and according to the need and size of the family, no of persons are employed. They have made a separate a/c for their employees and Rs. 25/- collected from the house are deposited to that a/c. Rs. 2000/- is paid to the samity by LDA and Rs. 2000/- is paid to the samity by NNPP. To clean and to collect the garbage, the equipments needed like bucket, duster etc. are provided by samity and is also maintained by them.

Nainital celebrates Cleaning day in 18<sup>th</sup> September where LDA involved the samity also. LDA have arranged some community toilets and have named them A, B and C. A graded toilets are mostly found in tourist places and are used by tourists. B is for both tourists and local and C is only for local. The revenue generated by implementing ticket system in A and B toilets are used for maintaining the C graded toilets. The revenue is divided either by 40-60 or 50-50 by samity and LDA respectively. Chairman, Commissioner and administrative management are done by Housing Department.

From the 10<sup>th</sup> and 12<sup>th</sup> Finance Commission some funds are arranged for the lake conservation programme. Major work under NLCP was fencing, roads making, pathway making and other minor works. The rules followed for this project was implemented by NLCP, not by any state govt. Population in Nainital is always increasing and mostly the floating population and along with that sewage is also increasing. The catchment area is connected with sewage, drainage channel from where it is carried to a STP, 3 km away from the lake. The water is maintained up to 100 BOD level then the water is released to the village for irrigation purpose where the STP is set up. There are total 62 drains in Nainital, whereas 23 drains are connected with lakes.

The Lake Development Authority has authorized the Pantnagar University to formulate decisions regarding the cultivation and catching of fish. Due to over extracting of fishes, the University has decided to ban the fishing activities in Nainital. They decide the time and duration of fishing. It is done only to maintain the biodiversity. But without their concern illegal fishing activities is commonly found. In Bhimtal, fishing is done followed by some restrictions. Fishes are caught up to 4kg per person per day. This limit is maintained throughout the year by the fishermen.

During field visit we come to know that the Lake Development Authority (LDA) has banned Fishing in Nainital Lake. Almost 1.5 lakh fish has been fed in the lake water. Pant Nagar University collects the fishes from the lakes when they grow large in number, and instead they

plant fish fingerlings for culture. Water of the lakes had become dark due to low dissolved organic matter level; however Nainital Lake Conservation project was undertaken to clean the lakes' water and oxidize them. The LDA is a regulatory body. In 2003, Government declared to conserve the 5 lakes of Bhimtal, Khurpatal, Nainital, Sattal and Naukuchiatal.

Earlier sewage water fell into the Nainital Lake, however now due to programmes under taken by LDA things have been reframed. The pathway around the Nainital Lake has been tiled so as to prevent the dirty plain water from flowing into the lake water and thereby polluting it. This is likely to have enhanced the experience for tourists visiting the lake, encouraging them to stay at the lake side for longer, benefiting local livelihoods. LDA has constructed community toilets in the area. This is done to prevent open defecation in the lake. Programmes for solid waste management have also started. Mission Butterfly a project which was started earlier has been successful.

According the LDA official the different activities undertaken by them has actually benefited the local people. Fishing has been banned but it has not totally affected the livelihood of the fishermen because here people are engaged in multiple livelihood options. Those who were engaged in fishing are also engaged in boating. So they are now earning their income from boating. And with a rise in the number of tourists visiting Nainital every year, it is hopeful that it would lead to an increase in the livelihood options of the people.

The Fisheries Department, Bhimtal (Nainital district) and Nainital Nagar Palika make rules on how much quantities and what species of fish can be collected. To maintain the bio diversity of the lake there are restrictions put on by the Fisheries Department, Bhimtal (Nainital district) , each fisherman can withdraw 4 kg of fish per day. The fishes are caught by the method of angling, and only the people having the fishing license are permitted to catch fish in these lakes. It must be mentioned that fishing license is issued by the Fisheries Department, Bhimtal (Nainital district).

The Irrigation Department of Bhimtal provides the boating licenses to the boatmen of Pandeygaon and Chanaoti villages whereas boatmen of Nainital get their license from Nainital Nagar Palika Parishad (NNPP). Water for irrigation is provided by the Irrigation Department of Bhimtal to the farmers of Chanoti and Pandeygaon. Water supply of Nainital is operated and maintained by Uttarakhand Jal Sansthan (UJS). They supply drinking water all over the Nainital town. The drinking water is drawn from the Nainital Lake. Though they deny that they supply the drinking water from deep bore tube wells but other Government Departments informed that they acquire lake water for drinking purpose. These local governing bodies mentioned above are embodied with the authority of collecting water taxes and water charges for the respective villages.

Thus in this way the government monitors the water supply and restricts the number of boats. According to the State Biodiversity board, the lake is a public good <sup>4</sup> which has the property of non-rivalry and non-excludability but by providing licenses the state government does rationing of public good, i.e. restricting its use after a certain level. [50]

### 5.2.1 Nainital City Development Plan [51]

The increasing urban growth, large tourist arrivals, and consequent overcrowding, congestion and urban pollution threatens the very centre of its existence – *Nainital*. A project for conservation of Nainital and other Lakes, jointly funded by Government of India and Government of Uttarakhand is currently under implementation. The city requires substantial investment to upgrade, expand and provide new infrastructure to sustain its tourist economy and meet the growing demand of rapid pace of urbanization. This City Development Plan (CDP) is intended to provide a perspective for development of Nainital for the next 20 years, keeping in view longer term growth. In keeping with the guidelines of the JNNURM for preparation of the CDP, a process of consultation and participation of all stakeholders have been adopted from the initiation until finalization of this CDP. The process started with identifying and sensitizing the stakeholders and continued through preparation of city vision, prioritization of infrastructure provision and preparation of sector strategies, concurrently with analysis of current situation of various elements of urban planning and infrastructure development. Strategies, interventions and action plans were developed in continuous consultation with the stakeholders. HighARCS should aim to work towards lake conservation, protection and development with ecological safety. The views of stakeholders have been consolidated to form the city vision. The sectoral key issues that emerged out of public consultations, field visits, analysis of data from secondary sources and discussions with Nainital Nagar Palika Parishad and para-statal are:

**i) Physical Growth and Environment:** The major issues that face Nainital are:

(a) Hilly terrain surrounding the Lake, forest areas and ecologically fragile areas restrict the physical expansion within the municipal boundary; (b) due to limited space for construction within NNPP, there is immediate need to develop townships outside NNPP to depopulate the city and accommodate the future population; (c) although ecologically sensitive areas have been earmarked as ‘prohibited areas’ in the master plan, there is high incidence of unauthorized construction in these areas; (d) many buildings in the old city areas are in dilapidated condition; (e) growth of slums and squatter settlements is leading to environmental degradation (f) unsafe

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<sup>4</sup> Remark of the researcher: From a perspective of new institutional economics, It can be argued that although the lake seen as scenic beauty can be classified as a public good, the aquatic resources of the lake would rather be classified as common-pool resources., hence the need for local rule systems agreed amongst the users.

construction practices render the buildings vulnerable to natural disasters; (g) landslides on surrounding hills, and (h) pollution in Naini lake.

ii) **Water Supply:** Piped water supply was introduced in Nainital in 1898 from Pardadhara spring situated inside the town. The system has undergone incremental expansion over a period of time. Originally, it was a gravity flow system. Tube wells, located at the periphery of Nainital Lake near 'Flats', are now the main sources of water for Nainital City. Based on the current water production and a reasonable 30 % (UFW) unaccounted for water, average availability of water at consumer end is 135 lpcd, which is satisfactory. However, unequal distribution of water, low pressures, old dilapidated pipelines, uncontrolled zoning and unsatisfactory operation and maintenance requires thorough reorganization and up-gradation of this sector to meet future demand.

iii) **Sewerage:** A skeleton sewerage system was laid in Nainital in the beginning of 19th century. Rapid urbanization and inadequate sewer system led to the problem of overflowing of sewage in storm water drains ultimately discharging into Nainital Lake. To put an end to this, under the NLCP, two STPs of 5 mld each are proposed, of which one is under implementation. The city needs investments to expand the sewer network, provide decentralized STPs and on-site treatment in low-density areas.

iv) **Storm Water Drainage:** In a hill town like Nainital, adequate storm water drainage facilities are required to prevent soil erosion and control of pollution to lakes and water bodies. Investments are needed to address the needs of (a) repairs and reconstruction of drains in critical sections, (b) additional crosswalls and catch-pits, (c) provision of screens at outfalls, (d) disconnection of side drains from sewers and (e) removal of obstruction in drains.

v) **Solid Waste Management:** NNPP's estimated total daily MSW generation ranges between 12 MT to 18 MT during peak and non-peak tourist seasons. The city has not met its mandatory obligations under the Solid Waste Management Rules, 2000 and is burdened with an inefficient collection system, environmentally unsound disposal practices and uncontrolled dumping at a site down a gorge like formation. It thus requires immediate and sustained effort to upgrade to an acceptable level.

vi) **Roads and Transport:** Nainital City comprises of 85.09 km of roads, of which 25.94 km (160 nos.) are maintained by NNPP and 59.15 km (51 nos.) including 4.0 km National Highway are maintained by PWD. Growing number of vehicles and lack of space led to congestion in Nainital.

Traffic management, road hierarchy and provision of parking are greatest needs. Pedestrianisation of tourist areas and alternative intermediate transport are of utmost importance. The city needs immediate investment in these areas.

vii) **Heritage and Tourism:** Nainital is a known destination in the northern part of India. Tourists are attracted by the beauty of Nainital Lake surrounded by hills, lush green forest areas and its rich cultural heritage. Its rich heritage needs to be conserved and showcased to promote tourism through diverse means such as interpretation centres, experiential museums, walks, publications, etc. Other elements, which need attention, are: demonstration of model architectural elements and restoration of heritage buildings such as cemeteries, churches, old temple sites. Nainital has the potential to tap high end tourism by development of eco tourism and adventure tourism.

viii) **Urban Poor:** Nainital has about 10 slums scattered over the city, providing shelter to more than 9,000 people which forms 21% of urban population within NNPP. The access to basic services on an overall basis is not too bad although conditions vary. Majority (85%) of all the households have in-house water connection. Of the sample households, 97 percent have a latrine in the house. Some of the BPL families do not have pour flush toilet. Only 14 percent of slum dwellers do not have paved approach road. Condition of the streets is not very bad in the town and there are street lights of which most are functional. The main issue is ownership of land. Of the below poverty line (BPL) population, 43 percent households and 14 percent of the poor do not have any legal rights of the land.

ix) **Institutions and Governance:** NNPP has very few functions in the municipal domain. Unlike ULBs elsewhere in India, NNPP has very limited role to play in the city's planning, development and infrastructure provision. In fact, solid waste management is the main function of NNPP. Conventional municipal functions such as water supply, sewerage, roads, etc. are in the hands of either para-statal or state agencies. In the absence of institutionalization of citizens' involvement through smaller ward committees and other mechanisms, city management has remained virtually an 'outsiders' job and not a participative civic management. In Nainital urban situation, there are too many institutions that have grown up under historical circumstances. Keeping in view the needs for coordinated development and institutional strengthening, well-thought-out institutional planning is of crucial importance. This cannot be a one-shot exercise and needs to be taken up on phased basis.

x) **Municipal Finance of NNPP and Finance of Para-Statals:** NNPP, UJS, and NLRSA (also known as LDA in NNPP) are the three most important agencies responsible for the urban finance in Nainital. NNPP's revenue receipts (own) mainly comprises of Property / House tax, rentals and advertisement. UJS's revenue receipts are mainly water tax and water charges. The

income sources of NLR SADA include development charges, compounding fees, conversion charges, interest etc. Over the years the income and expenditure have shown an increasing trend. NNPP still depends largely on state government grants for meeting its revenue expenditure. There is a need to provide suitable training on double-entry accounting/accrual system of accounting. There is lack of financial and taxation powers. Under the present financial status it is very difficult for NNPP to access funds from market. The data base and information management is poor and there is a lack of use of technology in infrastructure monitoring. NNPP proposes to adopt strategies to achieve the targets of Financial Reforms as mandated in the JNNURM guidelines. Among the many reform agenda items listed in JNNURM guidelines, conformity legislation on the basis of 74th CAA is of crucial importance. A new Municipal Bill has been drafted, and this should be finalized and given full legal form at the earliest possible time. At the local level, training and capacity building will need to be done for both political leadership and the professional staff in NNPP and the para-statal. The Urban Center within ATI may be suitably strengthened. NNPP's political and executive structure needs overhauling to enable it to cope with its responsibilities and large development projects in future. Although the formation of ward committees is not mandatory in Nainital, it is desirable to have greater level of interaction with the citizens. The ward committees are required to be set up in order to establish a citizen authority network.

#### Local policy frameworks [52]

Sl. No.	Functions under Schedule XII of 74 <sup>th</sup> CAA	Agencies responsible for Planning and Design	Execution	Operation and Maintenance
1	Urban planning including Town Planning	TCPO, NLR SADA	TCPO, NLR SADA	TCPO, NLR SADA
2	Regulation of land use and construction of buildings	NLR SADA	NLR SADA	NLR SADA
3	Planning of economic and social development	Planning, and Social Welfare Departments	Different Government Departments	Different Government Departments
4	Roads and bridges	PWD, NLR SADA	PWD, NLR SADA	PWD, NLR SADA, NNPP
5	Water supply for domestic, industrial	UPJN, UJS (for small projects)	UPJN, UJS (for small projects)	UJS

	and commercial purposes			
6	Public health, sanitation, conservancy and solid waste management	NNPP	NNPP	NNPP
7	Fire service	State Police Dept.	State Police Dept.	State Police Dept.
8	Urban forestry, protection of environment and promotion of ecological aspects	Forest Department, UEPPCB, NNPP	Forest Department, UEPPCB, NNPP	Forest Department, UEPPCB, NNPP
9	Safe guarding of interests of weaker sections of society, including handicapped and mentally ill	Planning, and Social Welfare Departments	Different Government Departments	Different Government Departments
10	Slum improvement and up gradation	NLRSADA, NNPP, SUDA	NNPP	NNPP
11	Urban poverty alleviation	SUDA, NNPP	SUDA, NNPP	SUDA, NNPP
12	Provision of urban amenities, and facilities such as parks, gardens and play grounds	Sports Dept., DNN	Sports Dept., DNN	Sports Dept., DNN
13	Provision of cultural, educational and aesthetic aspects	Department of Culture, NNPP	Department of Culture, HNP	Department of Culture, HNP
14	Burial and burial grounds; cremations, cremation grounds and electric crematorium	HNP	HNP	HNP
15	Cattle ponds; prevention of cruelty to	NNPP	NNPP	NNPP

	Animals			
16	Vital statistics including registration of births and deaths	NNPP	NNPP	NNPP
17	Public amenities including street lighting, parking lots, bus stops and public conveniences	UPC, NNPP, NLRSA	UPC, NNPP	NNPP
18	Regulation of slaughter houses and Tanneries	NNPP	NNPP	NNPP
<p>NIRSADA: Nainital Lake Region Special Development; TCPO: Town and Country Planning Organization; NNPP: Nainital Nagar Palika Parishad; UPJN: Uttaranchal Pey Jal Nigam; UJS: Uttaranchal Jal Sansthan; PWD: Public Works Department; UPC: Uttaranchal Power Corporation; UEPPCB: Uttaranchal Environment Protection and Pollution Control Board; SUDA: State Urban Development Agency.</p>				

### 5.2.2 Environmental sector vision on the situation in Nainital

The sector vision clearly states that the Government of Uttarakhand is fully aware of the sector goal to have a problem free storm water drainage system in the whole of the town. The strategies that ought to be in place are:

1. Strict control against dumping of garbage in the drains.
2. Awareness campaign to educate the masses.
3. Regular cleaning and maintenance of drains.
4. Banning the use of plastic bags.
5. Discontinue the practice of connecting the toilet outlets to the drains.
6. The practice of diversion of surface drains in to sewers should be stopped.

The problems were discussed by the Government of Uttarakhand with Uttarakhand Jal Sansthan (UJS), Uttarakhand Pey Jal Nigam (UPJN) and Nainital Nagar Palika officials along with public representatives in addition to the field visits.

The Honorable Supreme Court of India in its judgment of 1995, in response to the Public Interest Litigation, gave the following recommendations, which have also been addressed in the restoration measures mentioned above.

(i) Sewage water has to be prevented at any cost from entering the lake;

(ii) So far as the drains, which ultimately fall, in the lake are concerned, it has to be seen that building materials are not allowed to be heaped on the drains to prevent siltation of the lake;

(iii) Care has been taken to see that horse dung does not reach the lake. If for this purpose the horse stand has to be shifted somewhere, the same would be done. The authorities would examine whether trotting of horses around the lake is also required to be prevented;

(iv) Multi-storied group housing and commercial complexes have to be banned in the town area of Nainital. Building of small residential houses on flat areas could, however, be permitted;

(v) The offence of illegal felling of trees is required to be made cognizable.

(vi) Vehicular traffic on the Mall has to be reduced. Heavy vehicles may not be permitted to ply on Mall;

(vii) The fragile nature of Ballia Ravine has to be taken care of. The cracks in the revetment of Ballia Nullah have to be repaired urgently. [53]

On July 10th, 2009, the Supreme Court passed an order on the CAMPA issue in response to an affidavit filed by the Ministry of Environment & Forests, along with a report by the Ad-Hoc CAMPA Committee and endorsed by the Central Empowered Committee (CEC). These orders have finally resolved a crucial matter that had lay frozen for almost 7 years. Since October 2002, about Rs.9, 900crores of principal amount and Rs.1, 300crores of interest amounts has accumulated under the CAMPA account. This is money lying in banks and to be used for compensatory afforestation and other related ecological security enhancing purposes. [54]

Member Secretary of Uttarakhand Environment Protection and Pollution Control Board has created a New Provision of Law in violation of The Water Act, Air Act and Environment Protection Act and Hazardous Waste Rules. He has issued two consents under The Water Act and The Air Act on 30th April 2010 (i) for the period of 01-04-08 to 31-03-09 and (ii) for the period of 01-04-09 to 31-03-2010 to MS Shivalik Rasayan Limited, a non complying pesticide industry. [55]

### **5.2.3 Lake restoration [56]**

Based on the Water act some relevant implication can be derived. The Lake Development Authority in-charges the Bio-manipulation and aeration in the Nainital lake, under a project taken up jointly by the Central and the State Government.

In 2003, DO levels was 9.5 mg/lit now it is 9.5 at top at 8.5 at bottom. Transparency has increased now it is 2-3 meters. The visibility of lakes has increased since then. The lakes can be divided into three layers, Epylimnion, Thermo cline and Hypolimnion. Out of the three layers, the Epylimnion harbors fresh aquatic life and the Hypolimnion is the most polluted one. Due to the efforts put in by the LDA the Hypolimnion layer in Naukuchiatal has decreased from 44m to 28m and in Nainital it has been removed completely from 17m. The aeration contributes to the improvement of lake water quality by improving the DO level as well as thereby maintaining a healthy ecosystem. The Directorate of Cold water Fisheries monitors the pH in Bhimtal Lake on a regular basis, because the DCF uses the Bhimtal Lake as the reservoir of their fish Culture. The addition of nutrition for the fishes in the lake may sometimes contribute to the increase in the phosphorus level. To prevent eutrophication, the water is treated with 1ppm copper sulphate solution. The concentration of the  $\text{CuSO}_4$  is carefully maintained, so that does not reach the toxic level.

### **5.2.4 Nainital Lake Conservation Project (NLCP)**

The National Institute of Hydrology (NIH) of Roorkee who prepared a plan for the restoration of the lake, at an estimated cost of Rs 50 crore (about US \$ 10 million), sponsored by the Ministry of Environment and Forests, Government of India, are also now guiding the restoration measures. The Conservation and Management Plan evolved by NIH is not only lake centric but also proposes to tackle the immediate periphery of the lake which contributes an adverse impact on the lake. The “Nainital Jheel Parikshetra Vishesh Kshetra Vikas Pradhikaran”, the Lake Development Authority notified under U.P. Special Area Development Act 1986 is a Special Purpose Vehicle (SPV) set up for implementing the restoration works. The restoration works that have been implemented or are in different stages of implementation are the following:

- Limnological measures such as controlled aeration of hypolimnetic water, siphoning of hypolimnetic water, biomanipulation and limited sediment removal from the deltas of drains, which lead to the lake.
- Soil Conservation & Slope Stabilization measures in the form of soil conservation and watershed management activities in the catchment area of the lake, slope stabilization, Drainage line treatment, landslide scars to be treated with Coir geotextiles with gabion cross-barriers and proper maintenance and cleaning of drainage system
- Provide 100% coverage of the town surrounding the lake with sewers and Sewage Treatment Plants (STPs)

- Improved sanitation around the lake and in the catchments with new community toilets to cover all sections of the society, improved design of household toilets
- Limited dredging of the lake, particularly near the deltas of drains that bring sediments
- Fish (*Gambusiaaffinis*) introduced a few years ago to control mosquito larvae, the fish have started feeding on the larger zooplankton resulting due to scanty larvae population resulting in adverse impact on the lake water quality. This needs to be controlled by putting minnow traps in the lake.
- The outflow from the lake is into the Balia Nala drain controlled by a set of sluices located at the lake bridge. The sluices, which are old, need renovation and replacement. The Balia Nala also needs slope stabilization measures to check landslides
- Shoreline Development and improvement of facilities at all important monuments and temples located in the periphery of the lake and providing avenue paths and roads
- Improved Public Awareness and Public Participation programmes [57]

NLRSADA is the nodal agency for Nainital Lake Conservation Project (NLCP) to the tune of Rs. 65 crores. An amount of Rs. 47.96 crores (1 \$=46.65 Rs AS PER 14.7.10) is earmarked for Nainital Lake and the rest Rs. 16.85 crores for the other four lakes in the region. This programme is funded by the central (70%) and the state (30%) government. Under Nainital Lake Conservation Project, works have been proposed in the following broad sectors:

- Sewerage and sanitation works
- Hydraulic works
- Restoration and development works
- Catchment conservation works
- Infrastructure facilities
- Social awareness and participation plans.

Under National lake conservation and management project, several works are under implementation at Nainital. A brief description of works related to storm water drainage system and its performance is given below:

1. Disconnection of drainage system from sewers as 36 points.
2. Balia Nalla protection works.
3. Outlet works at Tallital.
4. Construction of community toilets in catchment area.

In consideration of above, the works mentioned at serial No. 1 and 2 i.e. disconnection of drainage system from sewers and Balia *Nalla* protection works have not been included in this Plan. [58]

### **5.2.5 Conservation, Development and Harvesting Plan for Medicinal Plants [59]**

Due to its unique bio diversity, the state is also home to several rare and endangered species of herbal and aromatic plants. Realizing the immense potential of this resource in the state, the state government has declared Uttarakhand a Herbal State. The state has taken various initiatives to promote the sector towards a comprehensive Conservation, Development and Harvesting (CDH) Plan for Medicinal Plants has been launched in the state.

- State Medicinal and Aromatic Plant Board has been established.
- Nurseries have been established in the state for Ex-situ conservation of Medicinal and aromatic plants.
- Four Herbal Gardens have already been established and six have been further proposed.
- Medicinal Plant Conservation Areas (MPCAs) have been identified in 10200 hectares area of Reserve Forest.
- Germplasm of 224 species of MAPs have been collected. Programmes on conservation of germplasm by practice of capture and culture fisheries to maintain the population of the endemic species in the Kumaon are being taken up by Directorate of Coldwater Fisheries.
- In situ populations of extremely rare and endangered species have been discovered and their proliferation program initiated.

### **5.2.6 Nainital experiences of community participation in environmental planning**

Community participation is absolutely critical at each stage of environmental planning and assessment. Public hearings, held to inform the community of environmental assessments and planned actions, can bring together all stakeholders, including project proponents, environmental agencies, NGOs, citizens, and project-affected persons.

The people in these areas are concerned about the preservation of the lakes. They are aware about the problems of the environment and also the importance of the lakes in their lives. Necessary action plans should have to be undertaken so that the aquatic resources could be protected and preserved from destruction and at the same time the livelihood of those who are dependent on these resources are also continued.

The tools outlined below aim to apply core principles of building local capacity of communities to prevent and mitigate disasters, create partnerships among stakeholders, share and exchange information, and develop learning and decision-making tools to address disaster impacts. All

tools incorporate common elements, such as assessment, stakeholder involvement mechanisms, and monitoring.

Taking a pledge to cleanse the Ganga river from its source in the Himalayas and along its journey to the Bay of Bengal, Uttarakhand Chief Minister Ramesh Pokhriyal Nishank started “Sparsh Ganga” campaign in 2010. [60]

Residents of several villages near the tourist town of Nainital face an acute water shortage in the recent years, and are compelled to travel about two kilometers to fetch drinking water as according to them, water at home is only available for an hour. In this area water from two resources are obtained, one is gravity and the other one is from tube wells around 37 MLD (Million Litres per Day) from these resources are obtained. The authorities however cite the cause of this shortage of water on the lack of distributaries system but things seem rosier in the future as they are working on this project and setting up 14 overhead tanks, distributaries systems to rectify the water shortage problem.

Civic authorities in Nainital also have launched a fresh demolition drive of illegal buildings and structures, which were posing a threat to the fragile landscape and environment of the region. The natural beauty of Nainital that attracts hordes of tourists every year is gradually fading away with the coming up of several concrete structures, both legal and illegal. The Supreme Court also had taken a serious view of such developments, forcing the Nainital Development Authority to knock down all these illegal structures. Environmentalists have always maintained that the rapid illegal construction were responsible for the decline of greenery in the city. [61]

In a bid to conserve the water body, the residents have now switched on to scientifically designed garbage disposal system. Under the project named *Mission Butterfly*, the sweepers collect waste from each and every household and then directly transfer it to the compost pits where it is converted to manure. The main reason of this project is conservation of the Naini Lake. This lake of Nainital is connected to 62 drains out of which 23 drains directly fall into the lake and whole lake is polluted because of this. Through this (“Mission Butterfly”) the residents, hotels and schools and Nainital Lake Conservation Project has managed to control the waste that was falling in the lake. [62]

Apart from the residents, schools have extended full cooperation to the authorities, to save its precocious eco-system. Apart from helping the authorities in converting the waste to manure, the schools are educating their students about waste management. The people are upbeat about the mission as they feel that the project would help their town perk up its lost splendor. Because of this the waste has been managed and the garbage has been reduced from the Naini Lake.

Concerned with polluting water streams in Uttarakhand, schoolchildren in Nainital have also pledged to clean the Bhimtal Lake during their holidays. Renowned lakes of Nainital attract thousands of tourists from all over the country every year. But increasing pollution, usually caused by tourists, has become the main cause of lower levels and filth ridden water. Concerns over the state of these lakes, which are also sources of fresh water for the surrounding towns, brought together school children to take up the challenge to clean the Bhimtal Lake during their holidays. Students went into the water and cleaned the lake by removing algae and plastic bags, which blocked the mountain stream feeding the lake. According to a recent study conducted by D K Pandey of the Dehradun-based Forest Research Institute, the water quality of the Naini lake has been steadily deteriorating and is highly polluted due to the addition of exogenous wastes, as a result of more than 37 per cent increase in human population in the catchment area of the lake and too many tourists. Also, high siltation resulting in reduction of lake depth, the depth of lake has reduced from its original depth of 29 m in 1871 to only 13m in 2007. [63]

With an increasing amount of sewage, municipal and domestic wastes finding their way into the lake, the quantity of organic matter in its waters has risen sharply. This has starved the lake of cleansing oxygen, pushing up the biological oxygen demand (BOD) by over 20 times over a 10-year period. From 15.5 parts per million (ppm) in 1981, the BOD shot up to 357.23 ppm in 1991. Similarly, the concentration of free carbon dioxide in the lake which depends on the population of aquatic organisms and the type of waste added to the water ecosystem --- has increased by 670 per cent over the same period. [64]

The concern has been felt to such an extent that a 'Save Nainital Workshop' was organised by none else than the Department of Tourism and Environment of the U.P. Government in September, 1989. In this workshop many papers were presented on different aspects highlighting sudden rise in vehicle traffic, illegal construction, encroachment and squatting, clustering, noise pollution, vanishing greenery resulting in land slides on Cheena Peak, maintenance of drains and pollution in the lake which has virtually become a dumping ground for rubble and public sewage. Despite organizing of such a workshop, nothing much seems to have been done to preserve the pristine beauty of Nainital. In 1993, petition was filed by Dr. Rawat, who a member of social action group called 'Nainital Bachao Samiti', approached the Court seeking its assistance to pass such orders and give such directions as would prevent further pollution of already suffocating Nainital. By an order dated 14.7.1994, the Court had felt it fit, after having gone through the petition, to appoint a Commissioner for local inspection and to give report on various important points. A perusal of that report shows that on local inspection it was found that the lake has turned dark green with an oily surface and is now full of dirt, human faeces, horse dung, paper polythene bags and all sorts of other waste. Most of the sewer lines, which leak, ultimately discharge the faecal matter into the lake through the drains, which open into it. One more petition

was filed in 2006, in which a panel chaired by the state's chief conservator of forests directed that construction at Hanuman Garhi Park be stopped, which is at hillock.

By an order dated 14.7.1994, this Court had felt it fit, after having gone through the petition, to appoint a Commissioner for local inspection and to give report on the following points:

- (i) Whether construction of buildings in catchment area of Nainital lake is still going on.
- (ii) Whether ballia Ravine through which the outflow of the Nainital lake water passes during the rains is in a dilapidated condition and on a fragile base.
- (iii) Whether hill cutting and destruction of forest is going on in catchment area of lake and in Naini Hill especially due to construction of buildings.
- (iv) Whether water of lake is being polluted by human waste, horse dung and other wastes.
- (v) Whether heavy vehicles ply on the Mall Road, bridle paths on the hill sides and other vehicles ply on Bara Bazar and Talli Tal Bazar.

The Commissioner has also made certain recommendations, of which the following deserve to be noted:

- (i) Group housing and commercial complexes should be banned absolutely with immediate effect. Only small houses in flat areas, where there is no hill cutting or felling of trees, should be allowed for residential purposes.
- (ii) Heavy vehicles must be banned on the Mall Road and bridle paths.
- (iii) Immediate steps must be taken on a war footing to stabilize the Ballia Ravine and Ballia Nala.
- (iv) Lake must be cleaned and prevented from further pollution, for which purposes drains entering the lake must be maintained and the horses must not be permitted to go around the lake
- (v) Felling of trees should be made cognizable offence. [65]

Women have come under the banner of the Maitri Women Organization to initiate the cleanup drive. Cleanliness activities are undertaken once in every month. Not only are they trying to keep the lake clean and they are cleaning the streets and the waste materials lying nearby the drains from where unclean water enters the lakes. Thus, there is need to concentrate more on cleanliness in the area around the drains. The organization is also performing street plays to raise the level of public awareness about the virtues of cleanliness.

Uttarakhand women have formed a self-help group where they make and sell herbal medicine from the plants found in the forests around there. Most of these women do not have any formal education or training but this group allows them to make an income. Not just earning incomes they have also succeeded in raising awareness about the Himalayan herbs and plants, many of which are on the verge of extinction. [66]

With the vulture population declining alarmingly in Uttarakhand's Ramnagar area, which adjoins the Corbett Wildlife Sanctuary, a group of pro-wildlife activists and forest rangers are engaged in spreading public awareness about their conservation in the region. Under the banner of the Corbett Vulture Conservation Committee, the NGO activists recently used the annual Ramlilas, held during the Dussehra festival, to promote awareness about vultures. Jatayu Bhagwan, a Demi god in form of a vulture, who finds mention in the mythological epic Ramayana, was used to spread the message of conservation, the idea being to use mythology to educate the masses. The near extinction of vultures has caused ecological concern as vultures eat up carcasses and keep jungles free of diseases. As per reports, 99 per cent of the country's vulture population has vanished mainly because of consuming cow carcasses which are treated with the anti-inflammatory drug Diclofenac Sodium, the production of which was banned in 2006. It is awareness regarding this salt called Diclofenac because though the veterinary one has been banned, the alternate of that is human Diclofenac which is being used rampantly (for livestock of cattle). The drug was introduced in India in 1995. Although the production and sale of Diclofenac has been banned, the implementation has been slow. Vultures find a place in Schedule I of Wildlife Protection Act, 1972, the country's only legal framework to protect endangered species, which prohibits hunting and trafficking of endangered species. Conservationists around the world have also called upon the Indian Government to intensify a captive breeding programme for the threatened species. [67]

In recent times some enlightened citizens have come forward to halt the degradation of this beautiful town. Since 2007 every 18 September is now observed as 'Clean up Nainital Day', in remembrance of devastating landslide of 18 September 1880, which consumed 151 lives. On this historic day students and other sections of society join hands to clean the town.

GIZ's Regional Economic Development programme is based with the Uttarakhand Government's Department of Rural Development, where it is helping the state to bridge the existing economic divide. It combines activities designed to promote social equity, inclusive growth and poverty reduction, with uses of the rich natural resource base that ensure ecological stability. The programme aims to make markets work for the poor, stimulating market forces where possible to enable economic participation. It relies on dialogue amongst key actors and on partnerships between public, private and civil society organisations. It comprises three specific areas of action:

- **Promoting regional frameworks for inclusive market development:** This means improving the business and market environment by strengthening cooperation between the state government, regional and local administrative bodies, associations and the business sector. GIZ is helping to establish institutional platforms to foster public-private

dialogue on regional economic development, and it is promoting MSMEs and the demand for their services.

- **Regional marketing and promotion of Uttarakhand:** Here the focus is on tourism, specific agricultural products and efforts to build the state's image. The programme supports strategy development at institutional level and regional marketing activities, such as a promotional brochure and participation in national and international trade fairs.
- **Developing value chains:** The programme is strengthening business relationships between key stakeholders in selected sub-sectors and helping the stakeholders in marginalised regions to integrate in existing and new markets. At regional level, GIZ has collaborated with NABARD to establish a mechanism of support MSMEs in selected sub-sectors in rural and hill areas.

The programme focuses on creating business and investment opportunities that link rural economies. It therefore complements the current rural development agenda of the state government and is a partner of the Uttarakhand Livelihood Improvement Project for the Himalayas, which is financed by the International Fund for Agricultural Development (IFAD). The programme is also coordinated with some of GIZ's other initiatives in India, for example in the fields of rural finance and SME development.

Results achieved so far: Early success stories include the promotion of medicinal plant value chains. The programme has facilitated meetings between buyers and sellers, which have helped improve price transparency and also to raise prices for the producers (by almost 200 %). A contract with a Dutch buyer was established as a result of the programme activities. Mobile phone-based information services for farmers have also been developed, giving the users up-to-date local and customised information on commodity prices, the weather and other news.

In terms of regional marketing, the programme has supported the development of an action plan to strengthen Uttarakhand's regional brand for tourism. The Uttarakhand Tourism Board and a number of civil society organisations are now putting the plan into action, and a marketing organisation for MSME and producer groups has been established. A strategy to promote responsible tourism has been developed and implemented, and the state has participated in trade fairs, such as the ITB tourism fair in Berlin. [68]

### **5.2.7 Capacity-building (training, education, organisation) and empowerment**

The Forest Research Centre at Lalkuan in Uttarakhand's Nainital District has successfully cloned species of poplar trees, thereby lending a fill up to popular-based agro forestry. To promote this agro forestry, the species of poplar's F-2 series saplings are being cloned. The scientists of Forest Research Centre claim that these cloned plants could yield more production in less time. Wood

and teak are supplementary sources of income. For farmers, new clones are prepared by control hybridisation. 87 poplar clones prepared by hybridisation process between 2005 and 2007 are currently under field trial after observation at the nursery stage. The poplar trees are being cloned here since 1983. 20 poplar tree species under the 'L series' were cloned at this centre; the experiment was expedited after the formation of a separate state of Uttarakhand. To promote alternate sources of incomes for many farmers in the state bulbs of flowers, which were earlier imported from Holland, are now being grown in Uttarakhand. The Indo Dutch Horticulture Technology Private Limited in Nainital along with the Uttarakhand Government is implementing this project first time in India. Through the process of tissue culture with multiple techniques, millions of bacteria free Gentidiria plants are grown. According to DR Shailendra Kumar, a tissue culture expert "The basic benefit of this system is that all are disease free plants. They multiply at a fast speed so that if within a year, we can meet the demand for ten lakh plants easily. If it had been in fields, we wouldn't have made even one lakh of them,"

The Uttarakhand Government has installed a processing unit at the SIDCUL Florist Park in Nainital for growing these flower bulbs. Floriculture in India is being viewed as a high growth Industry. Uttarakhand has a suitable environment for floriculture and it is also emerging as an industry in the state. In an initiative to promote European blackberry production in Uttarakhand, the state government has authorities distributed saplings of the fruit among farmers across the street. [69]

Blackberry is not sown in the country, but the prospect of rich dividends from international markets has made the authorities and farmers to adapt to the fruit. That the farmers in the country were at an advantage, as the fruit could be reaped two months in advance as compared to their European counterparts. It is grown at an altitude of 2000-4000 feet. The fruit requires cold climate preferably less than 30 degrees centigrade for a healthy crop.

The best months for blackberry cultivation are February, March and April while the light soil is ideal for their cultivation.

Several villages in Uttarakhand's Banghat region have been seeing improvement in their economies through their conservation efforts of the freshwater fish, the Golden Mahseer by the state government. The fish used to be abundant in the River Ramganga, which flows through the Jim Corbett National Park, but became endangered to the point of extinction due to illegal fishing and usage of low-intensity explosives. Conservationists stepped up their efforts to grow its numbers and recruited locals, educating them on the importance of the Golden Mahseer, particularly its role in the local ecosystem. The conservation efforts have succeeded so well that now the villagers offer opportunities to sportsmen for controlled angling in the Ramganga. The money generated by such sales, usually between Rs 1,200 to 1,500 is divided amongst the

guides, the Mahseer Conservancy forum and the villages. With gradual increase in tourism and local people's involvement in the project, the population of the Mahseer has increased in the river. The Mahseer is considered to be the most prized catch among freshwater fishes. It reaches lengths up to nine feet and can weigh as much as 54 Kg. [70]

*Kumaon Grameen Udyog*, or KGU, is an associate of *CHIRAG* (Central Himalayan Rural Action Group) based in Nainital district, Uttaranchal. Its mission is to augment rural livelihoods based on local resources, introducing new skills where required. *KGU products*: ranging from hand woven woolens to natural herbs - all strive to convey that hand processed means quality. KGU has a small team that works with local artisans and producers. The weavers and knitters have all been trained and make products on given designs. They are paid on a piece rate basis. KGU has a weaving center in the village of Buribana, where the weaving is done. The knitting is done by women in their homes. [71]

The apricot and peach kernels are procured from local farmers in the area. The idea is to enhance incomes of local farmers from produce that would otherwise have no market value. Herbs have also been introduced to farmers as a crop that can be cultivated in a small way on farm risers, thereby augmenting agricultural income.

In a unique display of bionomical sensitivity, forest officials in Uttarakhand in Haldwani district have decided to transplant old trees instead of felling them. The step is being undertaken as part of the ongoing road-widening project on the Haldwani-Nainital National Highway here. Trees, which are over 40 years old, are being transplanted under this initiative. These trees are first taken out of the surface along with their roots and then shifted to about 200 meters away with the help of large cranes. The Forest Department has plans to undertake 50 trees. It costs about Rs.5,000 to 7,000 for transplantation of a tree. It takes about five to six hours to transplant a tree. The attempt, carried out under the supervision of environmental experts, was undertaken to make way for a new highway coming up in the region. Using coordinated efforts of technology, the meticulously planned transplantation exercise was aimed at creating 'green' avenues for similar development initiatives in the future. A team, headed by the district forest officer utilized all available resources to inflict minimum damage on the trees during the transplantation. According to experts, tree transplantation techniques usually have a 60 to 70 percent success rate. Basically, a week before shifting the tree, its roots and branches are trimmed so that it can store food and nutrients from the soil beforehand. Then, the tree is dug out of the ground in a way so that minimum damage to the roots is inflicted and this depends on the diameter and the age of the tree that is being uprooted. To minimize chances of infections, Indole Butyric Acid (IBA) is used to promote the formation of roots at their new location. [72]

Chiraag is a well known Non Governmental Organisation (NGO) in Uttarakhand. They supply seeds like wheat, beans to the farmers in the village. It has worked a lot for the upliftment of these regions and to stop the negative impact of the environmental degradation. They set up a Bio-gas facility plant which did not succeed due to the cold climatic conditions in these areas.

There is local organization named Gawal Sena which is operating in these areas. Their main aim is to stop the incessant sale of the land in the mountainous regions. They are trying to organize local people to protest against these constructions which are occurring so frequently in these areas. [73]

The local organizations and the NGOs who are working for the upliftment of the social and economical condition of these areas recognize the importance of these lakes for the livelihood of the local people here. They are trying their level best to conserve the lakes as well as the mountains in an attempt to safeguard the livelihood of people residing here.

According to these institutions the problem issues of lake management are associated with the aquatic life, plants, landscape and water quality, i.e. anything pertaining to the realm of nature. People seem to be the root cause of the problems because of the damage they inflict on to the valued natural resources. If men are kept away from the lakes, it seems that environmental difficulties would be largely solved. However it is not simple as it sounds to be, because most of them depend on the lake for their livelihood. The lakes are important in terms of fisheries. The delicate balance that exists in the fragile lake eco-system is presently threatened by a number of man-made and natural factors like siltation, weed infestation, deterioration in water quality and pollution caused by tourist activity and mismanaged agricultural practices and land use around the lake.

Mission Butterfly for solid waste management and Lake Warden Scheme for control and minimization of pollution of the lake are two of the conservation plan under taken to protect the Biodiversity of the lakes. Fishing is restricted in Bhimtal and Naukuchiatal and it is strictly prohibited in Nainital. The fish culture and study is conducted by Pantnagar University and the Cold Water Fisheries Department, Bhimtal (Nainital district). Regularly fish fingerlings are planted in the lake water to maintain the Biodiversity.

Apart from these, efforts put in by the local organizations are showing positive results. The tendency of local residents, of selling off their land to builders and promoters has somewhat been curbed. Integrated development of watersheds takes care of water, crops, fuel, fodder and livestock with a view to develop the overall economy. Several NGOs with people's participation are trying to reset watershed management by planting trees on the top of the slope to retain the water, building tanks of cement and alkathene to save rainwater, building check dams on the streams to break the velocity of gushing water which brings silt along with it. [74]

A foreign company has built a water tank for the local people in Sanguri village. With financial assistance from Lake Development Authority (Nainital) and G.B. Pant Institute of Himalayan Environment Development which is under Bhimtal water supply, have built water tanks at the homes. G.B. Pant Institute of Himalayan Environment Development has built a water harvesting tank for using it in irrigation purpose.

There is also Boatmen union. Unions are helpful in managing any types of conflict which may arise in pursuing livelihood. This boatmen union controls the way boats operate in the lakes. That is they follow a queue and a number system. This number system has been introduced with consensus from all the boat owners and boatmen. A queue has to be maintained and then the tourists can be taken for a boat ride. There are also car owners and drivers union which provides car for rent for the tourists to visit different places.

Water tanks has been built in Sanguri village at every home with the help of Lake development Authority, Bhimtal and G.B. Pant Institute of Himalayan Environment Development, Katarmal, Almora. An engineer from G.B. Pant Institute of Himalayan Environment Development informed about the building of Water Harvesting Tank for irrigation purpose. This is done because there is no irrigation water facility in Sanguri village though it is very close to Bhimtal Lake. They are also involved in various other types of work such as to keep a watch on the erosion of the hills, to plant different flower saplings through poly houses.

It is highly effective as each boatman gets a serial number from the union and they wait serially for their turn to come. The union maintains a register which keeps track of the number of boats that are plying on an average each day and the boats which will ply the day after. For instance, during the off seasons, the boats are less in demand, so the boatmen know when their turn will come according to the serial number and so they can engage in other livelihood activities while they wait. This gives an equal opportunity for all the boatmen and means the opportunity is not only available for those with the best marketing skills. This union is very helpful as it gives them monetary and other kinds of help when they need. The union also keeps an eye on the whole system of boating for providing the best service to the visitors. According to the boatmen, the number of boats plying here can be increased in number as this assures the people an income since the system is numbered. They only want an increase in the tourists flow. There are also car owners and drivers union which provides car for rent for the tourists to visit different places. [75]

### **5.2.8 The historical trajectory of environmental management and regulatory measures introduced in Nainital [76]**

The restoration works that have been implemented or are in different stages of implementation in short are the following:

### **Chronology** of efforts to save Naini Lake:

**1993:** Writ petition was filed by Rawat, head, Department of history, Kumaon University, on conserving the Naini Lake.

**1995:** Supreme Court passed directions for proper maintenance of the Ballia ravine, banning of construction of multi-storied group housing societies in Nainital township, prevention of sewage and other pollutants from entering the lake. But still the authorities have Okayed new projects.

**2002:** Roorkee-based NIH (National institute of hydrology) is working on the restoration of the Naini Lake in under aRs 50 crore restoration programme sponsored by the Ministry of Environment and Forests. The Conservation and Management Plan evolved by NIH is not only lake centric but also proposes to tackle the immediate periphery of the lake which contributes an adverse impact on the lake.

**2004:** NIH working on means clean the lakebed of accumulated pollutants

**2006:** Another petition filed by Rawat seeking a ban on building in eco-fragile areas, that is, the catchment area of the lake. The public also protested. As a result, a panel chaired by the state's chief conservator of forests directed that construction at Hanuman Garhi Park be stopped, which is at hillock. This construction would have destroyed Himalayan oaks, which store water and release it for springs that feed the lake. There were 250 springs before 1950 out of these, 30 remain by today. No action has been taken to stop construction elsewhere.

**2008:** The authorities implemented scientifically designed waste management project in order to restore the lost grandeur of the Naini Lake. Bio-manipulation project is being implemented in the lake after the lake's ecosystem got cleaner. Under this project, 35,000 Mahseer fish have already been released into the lake.

In December, the residents switched to scientifically designed garbage disposal system. Under the project named Mission Butterfly, the sweepers collect waste from each and every household and then directly transfer it to the compost pits where it is converted to manure. Through this there can be control on that was falling in the lake. Students are taught in school regarding garbage disposal and lake conservation.

**2009:** The Supreme Court has asked an environmentalist to approach the Uttarakhand High Court to stop large-scale illegal constructions and felling of trees in Nainital to preserve the beauty of the town and the main lake by strictly implementing an earlier order of the apex court. The apex court's order came after senior counsel Vivek Singh Attri, appearing for the petitioner, said multi-storied group housing societies and commercial complexes were coming up in the

town with official connivance. Trees were also being cut in a big way in utter violation of the SC order and the Forest (Conservation) Act, 1980.

It gave the order that "Multi-storied group housing and commercial complexes have to be banned in the town area of Nainital. Building of small residential houses on flat areas could, however, be permitted." The court had also asked the state to make illegal felling of trees a cognizable offence and restrict vehicular traffic on the Mall.

**June 2009:** Bio-manipulation continues.

**August 2009:** Civic authorities in Nainital launched a fresh demolition drive of illegal buildings and structures, which were posing a threat to the environment and the lake.

**September 2009:** Maitri Women Organisation launched a cleanliness drive for Naini Lake.

A major problem of the local people in Bhimtal and Naukuchiyatal is the absence of proper nursing homes or hospitals. In case of any medical emergency the casualty will have to be taken to the nearest hospital in Nainital or in Haldwani both of which are nearly 30kms far. A few medical shops are there but they do not have large supply of newest available medicines. Hence, medical facilities, nursing homes should be developed in Bhimtal for the benefit of the local people. Department of Health, Government of Uttarakhand is the body responsible for its implementation.

However many implemented plans of the government has been widely criticized like the one regarding a narrow patch of forest, critical for movement of tigers and elephants in Nainital district of Uttarakhand, which has been blocked due to an infrastructure project resulting in a serious man-animal conflict, With the destruction of this vital corridor the entire Terai Arc Landscape stretching from the Yamuna river near Saharanpur in the west to the Bagmati river near the Chitwan National Park in Nepal in the East has been divided into two zones. The destruction of this corridor has affected free movement of wild elephants, thereby increasing crop damage and human killing on both sides of the corridor, said a joint statement issued by the Corbett Foundation, Wildlife Protection Society of India, Wildlife Trust of India (WTI) and Worldwide Fund for Nature (WWF)-India. The destruction of this corridor has affected free movement of wild elephants, thereby increasing crop damage and human killing on both sides of the corridor, said a joint statement issued by the Corbett Foundation, Wildlife Protection Society of India, Wildlife Trust of India (WTI) and Worldwide Fund for Nature (WWF)-India. The corridor, identified by the Wildlife Institute of India (WII) in 2003, featured prominently in a book, "Right of Passage", published by the WTI in 2005. The corridor was also endorsed by the chief wildlife warden of Uttarakhand and the Project Elephant Directorate under the Ministry of

Environment and Forests (MoEF). However, ignoring the scientific rationale, the Uttarakhand Forest Department allowed large-scale infrastructure development in this corridor and encroachment in this area has further aggravated the problem. [77]

### ***5.3 Responses and outstanding issues***

#### **5.3.1 Current Aquatic resource management issues and current solutions in the Nainital Lake District**

In the Lake districts of Uttarakhand, the lakes constitute the most important factor for tourist attraction and hence all effort has been directed towards the conservation and the preservation of the lakes. The different agencies have undertaken different policies and programmes to directly preserve the lake and indirectly to maintain the livelihood of the vast majority of the people who are dependent on these aquatic resources.

The issue of sustainable management of aquatic resources in Uttarakhand has been planned by the Government of Uttar Pradesh by constituting a Lake Development Authority in 1984. In addition a number of committees were appointed from time to time, the latest being the Brajendra Sahay Committee by the Uttar Pradesh Government (1994-1995).

Since then, the Government has proceeded to taking a number of steps against the environmental threats. To sum up, those steps are:

- To improve the quality of the lake water, many underground high pressure jets were laid near the lake bed at various places throughout the lake. The jets are supplied with highly pressurized air. This compressed air is released via a net of jets near the lake bed, the air bubbles through the water. Today one can see the results of hard work and efforts of the past few years.
- Previously, Nainital was eutrophicated due to pollution caused by sewage, garbage and drainage from hotels and residence and caused by tourists also. Biodiversity effect of Nainital lake was ruining at that time. Few years back there were very much insignificant number of fishes of different species available in the lake and can be called as a dead lake also. But now for the sake of conservation and development of the lakes and to attract tourists and to maintain their attraction towards the lakes, biodiversity is now reviving. Now the water of Nainital is clean and oxygenated. With the help of LDA, Kumaon University, some NGOs, DCF has started ex-situ conservation of lakes like fish seeds ranching. Ranching means they produce seeds artificially into hatchery and then they release it back into the lake system. There is a fish hatchery in Bhimtal where ranching is done by DCF, LDA, State Fisheries Department, Bhimtal (Nainital district), Foreign consultants and other organization. There is another type of conservation i.e. in-

situ conservation which means protecting natural habitat in the lakes and creating awareness among the local people and tourists also. According to Dr D. Sharma, Principal Scientist of Directorate of Cold Fisheries, Nainital is confined with hotels and residences. These wastes from these hotels and residences are drained into the lake increasing pollution. Due to this pollution the amount of dissolved oxygen declined in the lake. As a major conservation task, aeration work is done by LDA in Nainital lake. This aeration helps to increase DO<sub>2</sub> in the water which will help in the survival of biological habitats, conservation of aquatic biodiversity. Sewage has been strictly clogged from hotels and residences. For these there are a number of awareness programmes and ranching programmes arranged over there. In Bhimtal, there is restriction of 4 kg/per day which is maintained by the department staff of Fisheries Department, Bhimtal (Nainital district) in Bhimtal according to Dr. J.C. Uppadhyay, Asst. Director of Fisheries Department, Bhimtal (Nainital district). The time zone of fishing is from sunrise to sunset. Another strict condition for fishing is that no one can catch Mahseer of less than 300 gm of weight. Mahseer seeds are released to 3 lakes from hatchery and also to National Research Centre. Department organize some programmes whose fund is allocated by Govt. like reservoir development in which there is awareness generation programme, seed stocking. For 3-4 years the programme is going on. In each district per year it is organized 3-4 time in different places

- The lake water has become visibly cleaner and BOD levels have reduced dramatically. To complement the lake aeration project, with the help of scientist from the GovindBallabh Pant University of Agriculture and Technology, Pantnagar. A number of plankton and algae eating fishes were introduced in the lake. It is known during field visit that LDA, DCF, Kumaon university, some NGOs with prior permission of LDA; DCF introduced these fishes into the lakes. This has resulted in speeding up the cleaning up process. Now unlike in the past no more dead fishes on the lake surface. In fact now the large numbers of colorful healthy fishes are a beautiful sight to see for tourists and local alike.

The following main proposals are recommended by the lake conservation programme as part of the Phased Action Plan of the Programme:

1. Reconstruction of road side surface masonry drains in damaged portions
2. Rehabilitation of existing main drains
3. Removal of obstruction from the drains
4. Slab culverts for internal roads

5. Precast covers over the drains
6. Construction of cross walls and catch-pits
7. Provision of fine screens with platforms for cleaning
8. Laying of under ground 450mm pipes in small lengths
9. Provision of manholes of 900mm or other openings where existing
10. Drains have been permanently covered other misc. works
11. Outfall structures

It may be ascertained at the DPR level that if any part of the works concerning item No. 3 and 10 have been taken up under lake protection works, the same may not be included for the preparation of the DPR. [78 ]

In the previous sections, a great number of concrete actions and programmes to improve the environment of the lakes have been presented. Before concluding, however, two on-going issues also merit to be mentioned.

One concerns the local organization, Jal Sansthan, which was established in 1975. It was established to meet the need of drinking water in several villages of the hilly areas. The organization is supposed to pay a tax to the Irrigation Department; however there is an age old problem between these two organizations. The Jal Sansthan denies paying any form of Tax for water, which comes free of cost.

The other issue is about fishery rules. The fishermen want greater assistance from the government organizations and they want that proper training should be provided to the fishermen so that harmful methods of fishing may come to a standstill. Illegal fishing should be prohibited; else the fish population would dip beyond control. However it must be mentioned that these fishermen are not a part of any rule making group.

Often it is seen that there occurs conflict of interests between the rule making organizations and the people for whom the rules are being made. Hence greater participation of common people would be necessary in the management of Biodiversity in these lakes without affecting the livelihood of the people. It is heartening that the local community is aware of the problems of the lake. A noteworthy step in this direction has been the voluntary banning of plastic bags by the association of local traders.

### **5.3.2 Policy opportunities and challenges for HighARCS action planning**

The main idea of this proposed action stage is to have some knowledge about the projected activities which will be beneficial for the local people. Unlike the lowland areas, in the highlands people have comparatively lesser livelihood options and so they are more dependent on the natural resources and the environment for their livelihood objectives. In the selected field site in Uttarakhand people are dependent on the aquatic resources or the lakes for their sustenance. Hence the objective of this management proposal is to develop some strategies so that the aquatic resources are conserved as well as the livelihoods of the local people are also sustained.

The present report has shown a situation in the Nainital Lakes District where the main challenges of conservation of the aquatic resources are related to the management of solid waste, waste water and soil-erosion related to the rapid urbanisation and the increased pressure from the tourism industry, which in turn offers the main livelihood opportunities for the local population.

The Environment Protection Act (1986) , the Water (prevention and control of Pollution) Act (1974) and Biodiversity Act (2002) are the most important acts which can support the conservation efforts. These Acts coexist with laws and policies on socio-economic development, including energy and infrastructure, which must be referred to when exploring wise-use management solutions for the aquatic resources of the lakes.

The most important government institutions for the HighARCS action planning concerned with environmental management have been identified to be: The Lake Development Authority; Department of Fisheries, Govt. of Uttarakhand; Directorate of Coldwater Fisheries; The Irrigation Department; The Nainital Nagar Palika Parishad (Nainital municipality); and the Uttaranchal Environmental Protection and Pollution Control Board. The improved livelihoods concern of HighARCS implies that multiple other government institutions are implicated, in particular the various social welfare Departments, etc.

The creation of the Lake Development Authority has increased the efficiency of the coordination of the many types of planning and management activities necessary to conserve the state of the aquatic resources of the lakes, regulatory measures have been successfully introduced at the Lake Nainital itself, and programmes against eutrophication, fish stocking programmes, waste handling and awareness raising have been undertaken by the authorities with some success.

Yet, such measures have not been sufficiently organised for the two other lakes included in this HighARCS site, and it appears that the more centralised administrative set-up has happened at the expense of the participation of the local institutions and community groups, although some successful attempts of involving existing groups have been recorded.

Linking conservation efforts to activities in support of local livelihoods can benefit from existing government poverty alleviation programmes such as the National Rural Employment Guarantee

Bill (2005). Some opportunities of improved livelihoods also exist through the provision of affordable renewable energy development programmes or support to the connection to the national grid. These suggestions need policy regulation sustaining the implementation of the projects e.g. subsidy arrangements. Such arrangements should be discussed and developed in co-operation with the relevant stakeholders.

## **End notes**

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## **Section 4**

**Institutions, Policy, and Conflict – Final Report from Buxa West Bengal.**

*HighARCS project*

**D5.1**

**Institutions, policy and conflict**

**Final report from Buxa West Bengal**

**Sept 30, 2011**

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### Executive Summary

The report on *'Institutions, Policy and Conflict'* is pursuant to the work package -5 (WP5) which suggests carrying out an analysis of the institutional setting and conflict between local, national and international institutional framework and legislations on bio-diversity. The chapter also helps understand the dynamics of conflict between 'uses' and 'users'. Based on the understanding of the above the objective is to test, following an action research format, feasibility and efficacy of conservation strategy and plans for sustainable environment and livelihood.

The report is based on the analysis of the existing institutional framework and legislation at the local, national and global levels. Interaction with the community and various other stakeholders following focused group discussion, consultations and workshops offered important insights. Observations at the field levels have helped practical appreciation of the dynamics that precipitates /mediates conflicts.

The report suggests that biodiversity conservation is guided by an international treaty which is ratified by India as well. The State of West Bengal is committed to the implementation of the provisions of Bio-diversity Act as promulgated by Government of India (GoI, Biodiversity Act, 2002). The project site of High ARCS is situated in the hilly terrains of Buxa (North Bengal-the northern part of the State of West Bengal). Buxa is situated in the reserved forest famously known as Buxa Tiger Reserve (BTR). BTR recently implemented a World Bank supported eco-development project aimed at reducing biotic pressure on the local biodiversity.

This report, based on the analysis of secondary sources literature and direct interaction with the stakeholders, confirms that there is policy coherence at the local, national and global levels showing uniformity of concerns at all levels, but also a few issues where different parts of the current legislation can be used to support conflicting stakeholder views on access to land and the ecosystem services in the area. An effort has been made to assess the biodiversity especially aquatic resources and pattern of access and control across class and gender. Then availability of livelihoods base has been analysed and potential for aquatic livelihoods resource has been looked into.

The report looks into policy perspectives on livelihoods and sustainable environment and underlines different institutional issues, which can reduce the conflicts between State institutions and local community users. The report offers insights into action planning for sustainable conservation of biodiversity. This would be immensely useful as a bench-mark to setup action research in the project site.

The basic institutional framework on governance follows the federal governance structure and strategy as prevalent in India. The federal governance strategy emphasizes local planning as a tool

for sustainable development. Government of West Bengal also follows similar strategy. Under the local governance (through Panchayati Raj Institutions) -the villages planning of Buxa is done by the Gramsabha and Gram Unnayan Sammittees (GUSs). All plans are to be locally done and organized. Since the area falls under the reserve forest, governance of the area is combined with the Department of Forestry on subjects related to forest and natural resources management. This makes things complex. On the one hand, there is the possibility of resources optimization there is always an avoidable conflict between the Department of Forestry and other local agencies including Department of Panchayat. Suppose the local planning indicates construction of a fish tank at a common place the same can not be done unless ratified by the department of forest. The coordination takes lot of time and energy and several useful local initiatives are sacrificed. This is the context for testing the feasibility of local actions related to aquatic resources management taking community as the anchor. The report comes out with important findings suggesting that there is possibility of convergence and synergy among different agencies including communities the same is not achieved because of a number of constraints including lack of awareness about various policy perspectives and missing trust among the agencies and individuals. The Integrated Action Plan(IAP) would hold this as a critical consideration while evolving testable and feasible action planning during the next phase of the project. Local elections in West Bengal in March 2011 have shifted the power from the Marxist Party to the Congress Party. It is however too early to say if this has any implications for the management issues of aquatic resources or the opportunities for implementing wise-use action plans at the HighARCS site in Buxa.

The outcome of the institutional analysis would be used to prepare Integrated Action Planning (IAP) to test the efficacy of institutional framework for bio-diversity conservation and sustainable livelihoods for the poor and the marginalized communities in our project site-Buxa.

Buxa, predominantly, is inhabited by minority communities including Dhukpa, Bhutias and Nepalis. They stay at the fringe which keeps them away from the mainstream. The locational isolation restricts their potentials from coming into full bloom and restrains them from dealing with the environmental challenges including challenges of governance which are indifferent to their needs and demands. Also according to the existing provisions they do not enjoy right over the land and therefore advantage of the primary source of livelihoods. Linguistic barriers stop them from freely and meaningfully communicating and collaborating with the agents of change. Their participation in the electoral process is also adversely influenced because of their minority status.

The key issue in the conservation is lack of awareness about different provisions of the bio-diversity acts which works adversely in two ways-they are vulnerable to 'stretched explanations' of the

provisions against them. The awareness building and information sharing would be important action plans to deal with this issue.

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**Acronyms and Abbreviations**

BSJA - Buxa Shiksha Jyoti Abhiyan  
CBD - Convention on Biological Diversity  
EPA - Environment Protection Act  
FAO – Food and Agriculture Organization  
FD – Forest Department  
FMC - Forest Management Committees  
FTC - Forest Protection Committees  
GEF - Global Environment Facility  
GUS - Gram Unnyan Sammittee  
ICDS – Integrated Child Development services  
MNREGA - Mahatama Gandhi National Rural Employment Guarantee Act  
NBSAP- National Biodiversity Strategy and Action Plan  
NFFPFW - National Forum of Forest People and Forest Workers  
NGOs – Non Government Organizations  
NRLM - National Rural Livelihoods Mission  
PPP - Public Private Partnership  
SGSY - Swarnjayanti Grameen Swarojgar Yojana  
UNDP - United Nations Development Programme  
VDC - Village Development Committees  
VEC - Village Education Committees  
WP – Work Package  
WUA - Water Users Associations

## 1. Introduction

### 1.1 Background

HighARCS is set around the assessment and conservation of high land aquatic resources and access and control of the marginalized communities over them. The sustainable livelihoods framework underlines the inevitable role of social capital-association and networks-in the management of sustainable livelihoods. The central concern of HighARCS is improving participation of the marginalized communities in the management of bio-diversity and make wise use<sup>1</sup> of them to sustain their livelihoods. The government is serious about conservation of biodiversity. The Biodiversity Act (2002) of government of India is the overarching policy framework for the promotion and conservation of bio-diversity and regulation of eco-system services. The policy framework envisages a broad base of stakeholders which includes government officials, local government, people's representatives and community. Although there is no specific provision in the context of the high aquatic livelihoods resources government focus on the conservation of biodiversity is quite in conformity with the HighARCS focus and objectives.

The Convention on Biological Diversity (CBD) has underlined the involvement of marginalized communities as an essential condition for sustainable bio-diversity and there by sustainable livelihoods (CBD, 1992).

- The basic objectives of HighARCS are Developing an understanding of the importance of aquatic resources in high land area;
- the changing conditions in the upland environment and the conflicting demands of those dependent on its resources;
- understanding eco-system services and ensuring continued supply of ecosystem services and finally livelihoods in particular for the poor and marginalized communities.

The project intends to develop a unique method of integrated bio-diversity, use and non-use values, livelihoods, economics and policy assessment, formulating Integrated Action Plans (IAPs) addressing conservation, livelihood and policy concerns and opportunities with the full range of stakeholders, notably local communities influencing state policies and working practices at local, state and federal levels, relevant to the conservation and planning of aquatic resources.

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<sup>1</sup> For a discussion of the wise-use concept, please cf. footnote in the Institutions, Policy and Conflict Overview Report.

CDHI has been actively involved in facilitating local level innovations, planning and implementation of livelihoods programs, in collaboration with different state and non-state agencies including local communities and undertakes advocacy and lobby to safeguard the interest and entitlements-which have been guaranteed by the affirmative constitutional provisions to its citizen- of the marginalized communities. The HighARCS project has been formulated with the understanding that bio-diversity is important to ensure livelihoods opportunities for the poor and the marginalized. CDHI has been working in the region, including the upland of Buxa, with the local communities covering livelihoods entitlement of the local communities. High-ARCS is a natural choice for CDHI to use its learning and fine-tuning its evolving strategies while implementing HighARCS. Successful implementation of the HighARCS project is supposed to strengthen and consolidate its efforts at expanding and consolidating livelihoods opportunities for the local communities. The approaches, strategies and tools used to build the capacities of the local communities, in dealing with critical issues can help them apply the same while conserving aquatic biodiversity in the region. Earlier the communities, including the women and the children, have undergone micro-planning exercise which helped them appreciate the complexities of the local ecology. This can be utilized by the community.

Institutions are important for the conservation and sustainable management of bio-diversity. Institutions reflect commonly held goals, norms and practices adopted toward achieving the goal. Institutions can be seen at various levels - national, state and local. These levels are relative in nature and can play inter-supportive role in achieving the larger (commonly held) goals.

The national, state and local agencies having common goals and have their specified areas of responsibilities. The outcome of their efforts would depend upon the synergy and convergence. If they support each other through proper coordination the chances are that they would together make better impact and achieve the commonly held goal.

The present report, on institutions, policy and conflict, seeks to analyse the institutional framework at the national, state and local levels that govern state and people's action toward bio-diversity, conservation and livelihoods. Keeping in view the objectives of HighARCS understanding of the institutional framework and policy perspective is essential to ensure that the objectives are achieved especially those, which concern institutional support and anchoring. The institutional and policy analysis will help understand the institutional and policy framework within which highland aquatic resources are managed. One of the important objectives of the HighARCS is to plan actions and follow-up for biodiversity conservation and livelihoods. The institutional analysis will help us have predictability about the existing policy and institutional framework coming in way or supporting the

proposed action plans. Efficacy of proposed strategies would depend upon the level of conflict between the present policy, market and suggested interventions.

The report will consider the overall institutional framework of governance at the national, state and local levels. State and national policies on bio-diversity and related subjects, which would factor in sustainable conservation of bio-diversity and livelihoods based on it, would be examined and analysed. The final analysis will suggest the tensions and conflicts at various levels, both inter and intra-institutional.

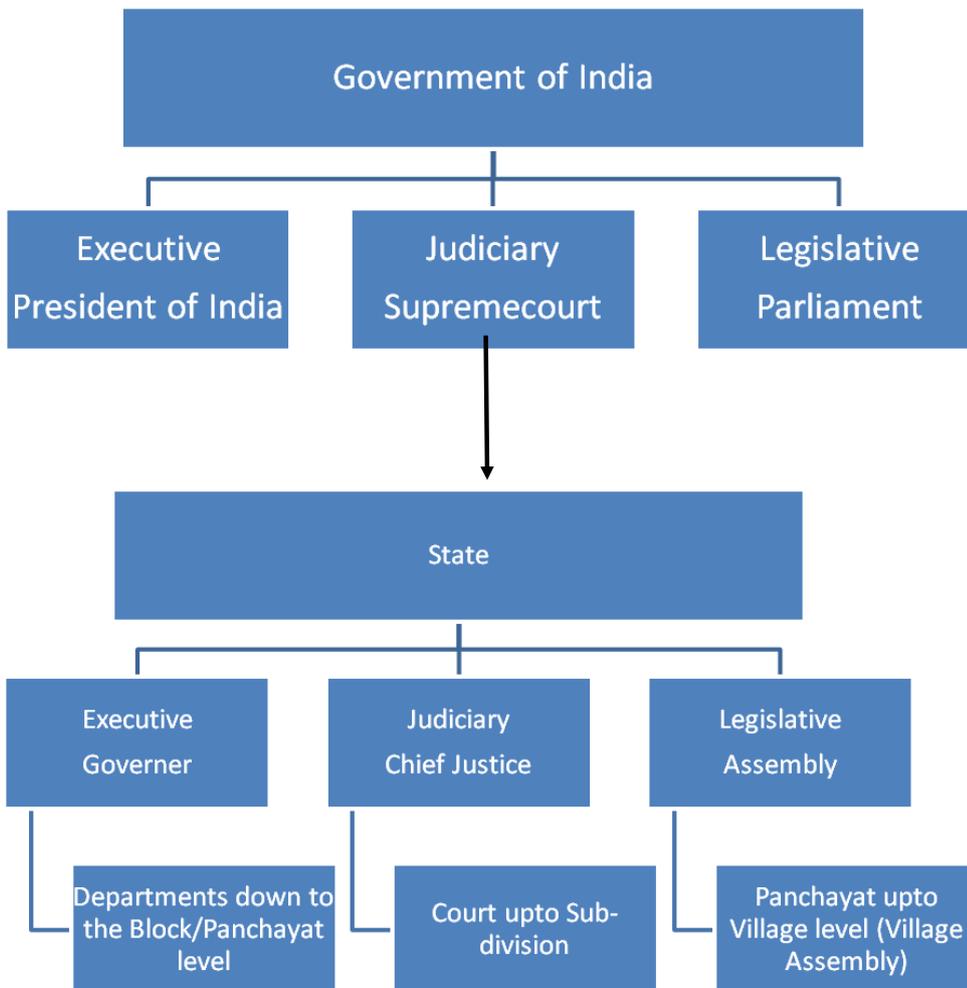
The analysis is done using available literature on institution and policy, stakeholder's consultations with different stakeholders, observation of the functioning of different institutions in the field and policy decisions. There has been intensive interaction with the local communities, which offered a range of their perception on institutions and how they work.

## **2.0 National governance systems**

### **2.1 Political and administrative organisation of Indian society**

India has a federal governance structure with independent Executive, Judiciary and, Legislative organs. The Indian Parliament comprises of two houses, the Lok Sabha (House of Commons) and Rajya Sabha (Upper House). The Indian Parliament has the authority for policy formulation through Acts. The Indian Parliament (Lok Sabha) has members who are directly elected by the people where as members of the upper House are elected by the members of the legislative assemblies of the states. Council of Ministers, headed by the Prime Minister, carries out the activities assigned to different departments (Ministries). The Lok Sabha initiates legislations, which is to be ratified by the Upper House and finally by the President of India before it becomes Act. The president can suggest modifications and changes in the legislation but cannot hold back the legislations passed by the two houses if the houses insist. Parliament is the legislative organ where as President is the head of the executive in whose name the execution of the legislative policies are carried out. The judiciary system is represented by the Supreme Court.

Fig. 1: Government of India-Governance Structure



For the convenience of governance the affairs of the country and states are divided into different functional Ministries and Departments. Some of the subjects are autonomous state subjects in some the National policy is binding on the states. Important Departments and Ministries include Environment and Forest, Water Resources, Agriculture, Fishery besides the key departments of Home, External Affairs and Ministry of Human Resources Development. The State governments

make adaptation to some of the national subjects keeping in mind the local tradition of governance and administration.

India adopts Marx Weber's form of bureaucracy, with each Ministry or Department headed by a Secretary at the National and state levels (Weber 1947). They carry out the affairs of departments in the name of the Chief executive – (The president in case of National Government) and Governor in case of State government. Grassroots democracy marks devolution of Governance in India which is guided by special legislative provisions. Panchayati Raj Institutions (PRIs) are the grassroots organizations of governance for the rural areas. According to a special provision PRIs receive funding directly to plan and execute different development programs. They also mobilize resources internally through tax and levies. The lowest organ of the PRI is Gram Sabha (Village Assembly), which evolves its plan for the villages and executes them too. Such plans represent aspirations and needs of the local people. Gram Unnayan Samiitees (GUS-in West Bengal) have been recent innovation in order to bring in planning efficiency at the village level. GUS is the planning body at the village assembly (Gram Sabha) level. It would be convenient to get the Integrated Action Plan (IAP) of the HighARCS project brought into the planning process at the grass roots level, through Gram Sabha, learning of what can, potentially, influence the higher level policies.

To better appreciate the needs of the local communities and to have greater involvement of people and civil society in the management of local affairs, including local level natural resources, several variants of civil society have evolved. In recent years Water Users Associations (WUAs), Forest Protection Committees (FPCs) and Village Education Committees (VECs) have evolved to take care of associated affairs at their respective levels. These grassroots institutions play important roles in the design and implementation of nationally and state sponsored programs especially in ensuring quality implementation and inclusion. These civil society institutions are self-evolving and autonomous in nature with strong potential for innovation and local level adaptation. Some of the local level civil society institutions have played a seminal role in mobilizing local communities and effectively implementing different programs.

## **2.2 Role of informal and traditional institutions including cultural institutions**

Traditionally, West Bengal has been a familiar home for the civil society and community based institutions. The Forest Committee of Mednipur has earned national and international acclaim. Similarly, Water Users Associations and Farmers managed pumps have shown credible performance in North Bengal. Farmers' managed pump establishment facilitated by CDHI and Women Federation of North Bengal-Uttar Banga Terai Mahila Unnayan Samitee (UBTMS) constitute valuable examples of the effective civil society institutions in recent years. Fishermen cooperatives have been quite strong

in influencing the government to ensure their fishing rights and other entitlements. Another important civil society institution has been Mistry Cooperative (Mechanic Cooperative) also facilitated by CDHI. These cooperatives have been formed by local mechanics that have brought about modification in the existing irrigation pumps with reduced consumption of fuel. Cultural institutions include clubs and folk art groups who use their expertise to influence different spheres of life. Recently, over the last decade, self-help groups have emerged as effective civil society institutions with saving and credit services as their entry point activity. Besides, the members of the group are oriented and trained to take up social and environmental issues as important agenda.

### **2.3 Role of civil society (NGOs, associations, unions, grassroots movements etc.)**

NGOs have emerged as important institutional variants more so in the development sector. Several NGOs like Ram Krishna Mission (RKM) have been very effective in mobilizing the communities and in trying innovations at the grassroots level. In the recent past Government has encouraged participation of NGOs as partners in development in the key sectors of women and child development, natural resource management, livelihoods management etc.. With the encouragement of the government the numbers of NGOs have been growing in West Bengal rather rapidly.

West Bengal is also very well known for local level clubs and formal and informal associations for specific purpose and objectives. Although they are informal in nature their role in mobilizing the community has been great and substantial. Some of the local clubs have been very effective in trying innovation of various nature and magnitude.

Each of the 13 Village Development Committees (VDCs), facilitated by CDHI, has strong component of promoting medicinal plants in their respective villages. They identify species, get them authenticated, put plants and nurture them over extended period. The emphasis is, now, on checking preservation of trees especially from near the water sources. This has helped the villages enhance their level of awareness and also proactively work to preserve them.

### **2.4 Policies on environmental protection, poverty alleviation and sustainable livelihoods in Buxa**

This section presents policy perspectives on environmental protection and poverty alleviation, which mediate sustainable livelihoods in Buxa.

#### **2.4.1 Policies on biodiversity conservation and sustainable management and regulation of aquatic resources in upland areas**

The biodiversity Act (2002) of Government of India is over arching policy framework governing promotion of biodiversity. The Act has the following salient characteristics:

- i) Conservation and sustainable use of biological diversity.
- ii) Conservation and development of areas important from the standpoint of biological diversity by declaring them as biological diversity heritage site.
- iii) Protection and rehabilitation of threatened species.
- iv) To respect and protect knowledge of local communities related to biodiversity.
- v) Regulation of access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources, and associated knowledge relating to biological resources.
- vi) To secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources.
- vii) Involvement of institution of self-government in the broad scheme of the implementation of the Act through constitution of committees.

Although there is no specific mention of the provision for the upland population the bio-diversity Act is not forthright in providing for opportunity for livelihoods for the marginalized upland communities. The Act rather entraps the poor through a number of regulatory measures. The communities in the upland are isolated and lack awareness on the critical aspects of conservation provisions as enshrined in different Acts. For examples the communities can use the minor forest produce for their household consumption use but lack of awareness keeps them uncertain about the boundary they should maintain. The Biodiversity Act is enforced by the Ministry of Environment and Forestry.

#### **2.4.2 National and State Level policies regarding natural resource management and allied sectors**

In general, all aspects of environment-air, water, forest,... are covered under Environment Protection Act(EPA) 1986. In 1980, the Department of environment was established in India. Later on it became the Ministry of Environment and Forests in 1985. Environment includes water, air, and land and the interrelationship which exists among and between water, air and land and human beings, other living creatures, plants, microorganism and property. Environmental Pollutant means any solid, liquid or gaseous substance present in such concentration as may be, or tend to be injurious to environment. Objective of the Act is to provide the protection and improvement of

environment. In EPA, article 48A, specify that the State shall protect and improve the environment. Important Acts and rules include – The Environment (Protection) Act; 1986 – The Environment (Protection) Rules; 1989 – The objective of Hazardous Waste (Management and Handling) Rules; 1989 – The Manufacture, Storage, and Import of Hazardous Rules; 1989 – The Manufacture, Use, Import, Export, and Storage of hazardous Micro-organisms/ Genetically Engineered Organisms or Cells Rules; 1991 – The Public Liability Insurance Act and Rules and Amendment, 1992. *Relevant (in the context of High ARCS) sector specific Acts include Water Act-1882, The Easement Act; 1897 – The Indian Fisheries Act; 1956 – The River Boards Act; 1970 – The Merchant Shipping Act; 1974 – The Water (Prevention and Control of Pollution) Act; 1991 – The Coastal Regulation Zone Notification etc. (The reference ,given at the end of the text, can be consulted for the details on laws and Acts)*

### **2.4.3 Orientation of and relationship between National and State Acts.**

The national Acts/ Laws on Environment are binding on the State. The states, however, are free to bring in and introduce local adaptations to adjust and address to the local situations/realities. The overall framework and focus of the national provisions have to be conformed to.

A significant element of the Acts –both national and state –is the overwhelming control of the state. Wherever there is any mention of the local community it is notional and unilateral –the community has to participate in the management of the given resource ‘as directed’. The National Water Policy (1987) clearly suggest –‘Farmers should be progressively involved in the management of irrigation systems. The term ‘**progressively**’ dilutes the focus and seriousness. The water policy further advocates integrated use of water, which is based on the wise use approach. Indicators for wise use are wide open (cf. note on p. 6).

Under the National Water Policy (1987) farmers participation in irrigation management has raised irrigation efficiency in some selected pockets (Mishra, 2011 personal communication). Under North Bengal Terai Development Project farmers successfully managed their irrigation pumps (NBTP, 2002). Participation of the local communities, which are also supported under the law, can help conservation of biodiversity as planned under the HighARCS.

Another important aspect is lack of coherence between different Acts within and between the National and state policies. For example central and state policies on poverty alleviation should have strong focus on integrated management of aquatic resources including water, which does not seem to be the case. Also the same act and its provisions cannot be applied in different contexts for example high and low lands. The environment protection laws are quite stringent to the poor who

have limited right over access to aquatic resources. Enjoying the access right is also dependent upon the interpretation and good will of the state agencies and their functionaries.

#### **2.4.4 Policies on poverty alleviation and sustainable livelihoods**

Approximately 35% of Indian population is below the official poverty line (US\$ 1 a day). Poverty alleviation and sustainable livelihoods is the priority of the national government. Poverty alleviation strategies include both group and individual based interventions. State governments while implementing the programs also have their own innovations. Swarnjaynti Grameen Swarojgar Yojajana (SGSY) has been one of the key programs offering multiple opportunities to the poor. Now, Government of India has come out with National Rural Livelihoods Mission (NRLM) for comprehensively dealing with poverty issues by creating skills and opportunity for income enhancement.

Government of India also has watershed development program. This is one of the most important integrated programs combining natural resources management, skill development and augmentation of biodiversity in the rural areas. The program has strong component of community involvement and micro planning. India has successful examples of watershed management in the diversified tract covering the length and breadth of the country.

#### **2.4.5 Policies and experiences with stakeholder participation in environmental planning and regulation.**

- As has been indicated earlier government of India emphasises stakeholders' involvement in environmental planning and has unambiguous position on the same. Watershed management is clear example of community involvement in natural resources planning. Million of hectares of land have been rehabilitated and employment and income opportunity created for the poor and the marginalized communities.
- Launched during the 70s **Joint Forest Management** is another example of community involvement in natural resources management, which is aimed at protecting the forest resources through community surveillance and protection. There is no clear policy on the involvement of the community in highland aquatic resources management. They presumably are covered under the environmental protection acts of the central and state governments.

### **2.5 Legislation and Policy Analysis of sustainable management of aquatic resources in the HighARCS study site.**

The West Bengal Inland Fishery Act (1984-section 6-8 Chapter III) takes special view of pollution of water causing damage to fish. Pollution causing damage to fish, by an individual or industry, is punishable under the Act with financial as well as or/and imprisonment. The same Act applies to Buxa as well. The Forest (Conservation) Act 1980 has stringent provisions but at the same time do not interfere, in any manner, or restrict the Nistar. The Nistar is the designation of recorded rights, concessions and privileges of the local people for bona fide domestic use as granted by the State Government under India Forest Act, 1927 or State Forest Act/Regulations. However, it has to be ensured that while allowing such rights, concessions and privileges to be exercised, the right holders do not resort to felling of trees or break up the forest floor so as to procure stones, minerals, or take up constructions, etc. The forest produce, so obtained, shall be utilized for any commercial purposes. The collection of such forest produce should be manual and should be transported through local modes of transport like bullock carts, camel carts, etc and no mechanized vehicles shall be allowed to be used in transporting such forest produce and only in exceptional cases with approval of concerned Divisional Forest Officers' tractors mounted with trolley may be used. Appreciation of such provision is at very minimal level of the Government forest officials, which lead to avoidable conflict.

Now, consider the National Mines and Mineral Development Act 1957 and national mining policy of 1991. The national Mines and Mineral Policy in the post reform period talks of private partnership with the hidden motive of profit. Buxa area, especially Jayanti River, has flow of dolomite causing damage to the aquatic species. Thus aquatic species are damaged not only due to human interference but also due to incoherent policies of different departments. In conclusion one can say that Government policies, as it operates in Buxa, as elsewhere, are geared toward conservation of biodiversity without having any special mention of upland aquatic resources. Another aspect is missing coordination among various departments and their Acts and Policies.

## **2.6 Laws and policies by management area for Buxa Nature Reserve**

### **Legislation and policies**

Buxa was one of those forests, which the British foresters boasted of. Originally grassland and Sal forests in stony highlands, the area was irreversibly altered when the colonial foresters moved in around 1865 and banished the indigenous swidden agriculturists like the Rava, the Mech, the Dukpa and the Garo. Evergreen trees colonised the empty spaces rapidly as the forest fires got "controlled",

and the foresters came to realize that they could not have new Sal plantations unless the fire regime was re-introduced ( Soumitra Ghosh, 2008).

Thus came the famous Taungya system of plantation, and the banished "fire-setters" were brought back to the forests as forest villagers. It was they who toiled, cut and burnt forests, and planted and protected new trees for nearly 150 years, and many days without any wage, up to the point the "independent" foresters of India decided that they need to save the Tigers of Buxa. Buxa forests were declared as a Tiger Reserve in 1983. The forests already had 33 recorded forest villages and four Fixed Demand Holdings (leasehold lands under control of the Forest Department). From 1990 onwards, forestry activities dwindled and came to almost a halt in many parts of the Reserve. The old dolomite mines inside the Reserve were closed down. In many areas, Non Timber Forest Produce collection was banned, and cattle grazing was declared an offence. Living inside the forests became a nightmare as foresters started to plan relocation strategies that implied that thousands and thousands of people suddenly found themselves bereft of livelihood. One after another, the old Sal trees (known as the Pride of Buxa) started to disappear, as jobless and hungry people were forced to take to forests.

The tiger conservation mechanism in Buxa swung into motion, and money from various sources like the World Bank came and went. Buxa was one of the seven Global Environment Facility (GEF) funded Eco Development Projects in India. But both wildlife and their habitat continued to disappear. Tigers became a rarity, so much so that no one knows exactly how many tigers are there in Buxa- now 4-5 may be an optimistic estimate. Although government estimate is not available, the local forestry services claim that as many as 34 tigers may be living in the area based on tiger excrements and foot prints seen, but the local communities claim that they have hardly ever come across any tiger

In Jayanti, very few people of this once-thriving and now a ghost settlement situated inside the so-called core area of Buxa Tiger Reserve know about the Forest Rights Act –that, among other things, recognise rights of tribal and traditional forest dwellers in areas declared as protected areas (see Soumitra Ghosh (2007) in WRM Bulletin N<sup>o</sup> 115). This settlement has apparently been identified as to-be-relocated village, and the State Forest Department has started the relocation proceedings. In Jayanti, the Range Officer can still forbid people to undertake renovation work in their own homes without permission from the Department on the grounds that it violates the Wild Life Protection Act, 1972. No one seems to know that under the Wild Life Protection Act, 2006 and the Forest Rights Act, 2006, the concept of core/buffer has changed so much that any demarcation of such areas need mandatory endorsement by the community.

Instead, the Range Officer and his staff would deal harshly with and would threaten the people to leave their land. Notices of relocation got many people angry: "Why should we who raised and protected these forests all these years be asked to leave?" said an old man. Almost the same happens in Buxa Road (a remote forest village, constantly threatened both by wild elephants and soil erosion) and the uphill village of Santarabari, another two villages targeted to relocation by the State Forest Department ignoring the new 2006 legislation. The way the Forest Department tries to conserve wild life in the Buxa Tiger Reserve seems far from being participatory. The agriculture policy of Government of West Bengal (2002) has thrown open and encouraged Public Private Partnership (PPP) it has emphasised commercialization of agriculture. The Buxa region has high potential for commercial agriculture including floriculture. This inter-alia restricts opportunity to the small forest dwellers as the big companies are joining hands to engage in large-scale commercial agriculture operations. The big companies would be guided by profit motives where as the control of the small farmers would be minimized. The examples are that under the garb of PPP the companies enter a specific area/sector and start infringing upon other areas/sectors in connivance with the state agencies and middlemen. The examples are very many showing over mining in different regions of the country. For detailed please refer to a series of articles by Arundhati Roy in issues of Wall Street Journal (Roy 2009).

#### **National energy policies<sup>2</sup> (jointly with the D5.1 Uttarakhand report)**

With high economic growth rates and over 15 percent of the world's population, India is a significant consumer of energy resources. In 2009, India was the fourth largest oil consumer in the world, after the United States, China, and Japan. Despite the global financial crisis, India's energy demand continues to rise. India lacks sufficient domestic energy resources and imports much of its growing energy requirements. In addition to pursuing domestic oil and gas exploration and production projects, India is also stepping up its natural gas imports, particularly through imports of liquefied natural gas.

India suffers from a severe shortage of electricity generation capacity. According to the World Bank, roughly 40 percent of residences in India are without electricity. The Government is aware of the low energy efficiency, and they have therefore passed the Energy Conservation Act from 2002 to improve efficiency standards.

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<sup>2</sup> <http://www.eia.doe.gov/cabs/India/pdf.pdf>

Geothermal, solar, and wind power hold little importance in electric power generation in the country. However, the government would like the share of renewable energy in electricity production to increase.

The solutions to these problems is an increase of energy efficiency through the whole energy chain – from the use of energy resources to the production of electricity and the demand side, and increasing the electricity supply capacity based on national and local renewable energy resources.

In respect of the HighARCSs project the challenge is how the use of renewable energy can be implemented as a driver for the development of the livelihoods without decreasing the biodiversity. Five projects can be suggested: 1. Possibilities using improved solar cells with higher efficiency and lower costs. 2. Possibilities of using improved batteries with more capacity and lower costs. 3. Use of improved cooking stoves with a higher efficiency. 4. Using of small hydropower plants. 5. Establishing of a local electrical grid – evt. supplied by solar cells or hydropower plants.

These suggestions need policy regulation sustaining the implementation of the projects e.g. subsidy arrangements. Such arrangements should be discussed and developed in co-operation with the relevant stakeholders like CDHI, the inhabitants of the village and private producers of the technologies.

## 2.7 Coherence between national laws and international treaties

The **Convention on Biological Diversity (CBD, 1992)**, known informally as the **Biodiversity Convention**, is an international legally binding treaty on biological diversity. The Convention has three main goals:

1. conservation of biological diversity
2. sustainable use of its components; and
3. fair and equitable sharing of benefits arising from genetic resources

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding wise use and sustainable development. Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993.

The convention recognized, for the first time, in international law that the conservation of biological diversity is "a common concern of humankind" and is an integral part of the development process.

The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use. Importantly, the Convention is legally binding; countries that join it ('Parties') are obliged to implement its provisions.

The convention reminds decision-makers that natural resources are not infinite and sets out a philosophy of sustainable use. The convention also offers decision-makers guidance based on the precautionary principle that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat.

India, being one of the signatories of the treaty, has seriously worked on making strategies to ensure conservation of bio-diversity. Pursuant to the CBD, a first major step was the development of National Policy and Macro level Action Strategy (1999) that called for consolidating existing biodiversity conservation programmes and initiating new steps in conformity with the spirit of the Convention. This was followed by implementation of a United Nations Development Programme (UNDP) and Global Environment Facility (GEF) sponsored National Biodiversity Strategy and Action Plan (NBSAP) Project (2000-2004) that yielded micro-level action plans adequately integrating crosscutting issues and livelihood security concerns. Besides, a number of policies and plans are relevant to the Convention, such as, National Forest Policy (NFP), 1988 setting goals and guidelines to areas under forests, National Conservation Strategy and Policy Statement on Environment and Development (1992) evaluating the nature and dimensions of environmental problems in India, National Agricultural Policy (2000) seeking to actualize vast untapped growth potential of Indian agriculture, National Seeds Policy (2002) covering plant variety protection and seed production, NWAP emphasizing on peoples' participation in wildlife conservation, comprehensive Marine Fishing Policy (2004) aiming at balancing the development needs of various categories of fishing communities, etc. The NBSAP, based on the evaluation of existing legislations, regulatory systems, implementation mechanisms, existing strategies, plans and programmes, using the final technical report of NBSAP report has come out with comprehensive action plans. The actions proposed in NBSAP are comprehensive and in tune with the CBD framework in all its dimensions. There is complete coherence between the international treaty and national strategies and action plans to achieve the goals and objectives of the CBD.

### 2.7.1 Coherence between national laws, provincial laws, and local laws

The national laws are pursuant to the CBD, which are binding on the signatories. Provincial laws are also in conformity with the national laws, strategies and action plans. Since there is no provision for the local bodies to formulate legislation they are to follow and implement the laws as formulated and enacted by the national and state governments. However, the national and provincial laws, by design, maintain fair degree of coherence. *(Different Acts/laws, at various levels, can be referred to under the reference at the end of the report).*

### 2.7.2 Coherence between laws and local practices of implementation

The local practices of implementation of the laws can be considered at primarily two levels- (1) implementation through the local agencies including Panchayati Raj Institutions (Village level local self governance) and the (2) community. The national and state level bio-diversity laws provide for the involvement of local communities and institutions of governance. The Fourth National report of the Convention on Biological Diversity (2009) mentioned about involvement of self-help groups in the augmentation of biodiversity. An analysis of the local practices suggests that the local practices are based on the traditional ways of conservation which is not systematic and, strictly, in conformity with the set goals. However, local communities have their traditional belief and value system, which they refer to and follow while conserving species –floral and faunal. For example certain plants are worshiped and taking certain fish species is forbidden from regular consumption. Continued wise use is advocated to maintain harmony of nature. Awareness about the need for bio-diversity and accountability of different stakeholders is not quite profound at the local level. Some Panchayats have engaged themselves in preparing bio-diversity registers as an effort to understand the biodiversity. While these are just isolated initiatives a systematic vigorous effort is missing. This adversely impacts conservation. One way forward on this which may be considered within the HighARCS action planning is to engage in evolving a systematic sharing mechanism which could permit such initiatives to reach out, may be through an electronic journal/bulletin. In fact there is a – ‘Honey Bee’ voluntary initiative of a group of management teachers and students who are documenting and disseminating such learning.

**Kommentar [Slund1]:** Please give the reference here. Is this initiative in the Buxa area?

### 2.7.3 Role and effectiveness of civil society and local community organisations

The Bio-diversity Act (2002), unequivocally, underlines the critical role that the community organizations have in the conservation of bio-diversity. Involvement of local self-governance institutions was specifically mentioned. The Fourth National Report to the convention on

biodiversity identified self-help group as the important vehicle to carry forward the provisions within the Act.

In Buxa civil society and community organizations are seen to be involved in a variety of areas of awareness building and program delivery. Self-help groups, promoted by the government and non-government agencies, are national priority now. Besides credit and saving, as the entry point activities, these groups act as strong pressure groups for implementing several important programs of the government. Beginning with the initiative of CDHI there has seen emergence of several groups in Buxa. These groups can potentially be important for awareness building and taking forward the conservation message. We list the community organizations in Buxa as per the followings:

#### **2.7.4 List and activities of community organisations in field site.**

**Self-help group:** Self-help groups are facilitated by the government as well as non-government agencies primary as a saving and credit groups. They are also active as watchdogs in protecting the forest and taking up issues of social development. Members of several of the groups are trained as birth attendants and ICDS workers, schoolteachers etc. These grass roots level workers can be useful and effective agents to monitor aquatic highland resources.

**Village Development Committee (VDC):** When the first initiative on primary education –Buxa Shiksha Jyoti Abhiyan (BSJA)- was made in the region it was implemented through the Village Development Committees (VDC), which took care of the supervision including fund mobilization and advocacy with the government. The involvement of VDCs resulted into successful implementation of BSJA and mobilization of livelihoods opportunities for the people.

**Forest Management Committees (FMCs):** Buxa region has witnessed an ambitious India Eco-development project emphasising people's committees as important institutions to protect the forest and help reduce biotic pressure on the forest. It also helped in creating alternative livelihoods opportunity for the people. The FMCs have played crucial role in the protection of the forest and creation of livelihoods opportunities for the local communities. Several agencies were attracted to support local initiatives. The area has strong potential for watershed management to be replicated in the High Altitude Resources Management.

**NGOs in the region:** Buxa has attracted several NGOs with their occasional project based interventions. They include institutions from outside the region or from around the region.

Important programs include immunization, cultural activities and awareness building program related to different schemes of the government. Recently, CDHI and another local NGO organized sensitivity training to the school children about the conservation of bio-diversity in general and bio-diversity of Buxa in particular.

#### **2.7.5 Roles for local institutions in facilitating sustainable access to aquatic resources**

The above mentioned institutions are not specifically focused on the issues of accessing aquatic resources, as there is not much restriction in accessing them for their domestic use. Fishing in Jaynti and Adma rivers are freely allowed so are the plants and other aquatic fauna. What these institutions have been doing relate to their awareness and capacity building which help them enhancing their negotiation capabilities. The larger issues of livelihoods for survival are taken up by them and the people have been taking decisive actions. However, these institutions are proving inadequate to take up the composite issues of diversity with equity in distribution of the benefits.

#### **2.7.6 What role can informal and customary institutions play in facilitating sustainable access to aquatic resources?**

It has already been mentioned, above, that people in the three project areas within Buxa Tiger Reserve, namely Adama, Buxa fort and Jayanti clusters are living as isolated groups with limited awareness of the issues beyond their day-to-day survival. The informal institutions are evolving and gradually taking control of the situations, which eventually crop up. Such institutions are the need of the hour to sharpen their focus and strengthen their actions. The traditional informal institutions have regulatory functions although their presence and functions are on the decline.

Customary institutions are basically related to their socio-religious functions. They are located in natural environment and thus their actions relate to various aspects of preservation and respect to the nature. From the personal experience of the main author of this report working with local communities in India, it would seem that by nature the community actions do not go against the conservation of biodiversity. Such customary institutions can play decisive role in facilitating rationale practice in accessing the aquatic resources. Constant decline in the stocks of aquatic biodiversity to the inconsequential level might also have influenced the access and control norms.

### **3.0 Issues and conflict over biodiversity conservation of aquatic resources**

As has been indicated earlier the study site falls under the Reserve Forest, which brings 'protection at any cost' as the main concern of the government. We have not found the local community as harming the eco-system services as they have learned to go with the provisions of the Reserved

Forest Act. Different projects (notably World Bank's Eco-development project for example) have seen people's readiness in contributing to the conservation of biodiversity. This has worked significantly in augmenting the ecosystem services.

The important factors constraining the wise use of ecosystem services are the lack of clarity of the provisions and technical knowhow of the forest managers. Using and misinterpreting various provisions of the Act the forest managers often resort to actions which blocks potentials of various ecosystem services to the optimum wise use by the community. For example: development of fish ponds by local communities has been discussed time and again but lack of seriousness in making coordinated effort led to the proposal being left incomplete. The forest protection laws would require coordination among different agencies, which is difficult to be achieved. Similarly developing tourism and support to the community for this would often come in the way as the police and paramilitary forces would put stringent conditions. Then there are natural factors like heavy rain and landslide, which adversely affects the capacity of the eco-system services.

With the suboptimal development and use of eco-system services, it is often the local community, as important stakeholder, which suffers. It could be argued that Buxa is a 'lose-lose' scenario where the rich biodiversity is not used to the optimum benefit of all the stakeholders. For example restrictions on development and expansion of eco-tourism citing the existing provisions is a lose lose scenario. Tourism helps larger population learn about the richness of the ecology and at the same time helps the local community access sustainable livelihoods. The policy perspectives emphasising protection of the forest and the local bio-diversity at any cost needs to be changed to a more proactive collaboration of the different stakeholders. The stakeholder Delphi survey currently undertaken at the Buxa sites within HighARCS is seen to contribute to such a task (HighARCS report Deliverable 5.2, forthcoming). Also, important to consider is the fact that local level actions are not permitted as they are to be guided by the national acts.

### **3.1 Brief overview of the situation of aquatic resources in the study site area**

There are several aquatic resources in the project area which include the followings:

- Drinking water. This is piped in from the rivers in most villages. However, in some communities, the wells dry up during the dry season. In Lepchakha, for example, they have to walk for two kilometres during this period to collect water from a river. In Adma however, there are no wells, and water must be carried from the river.

- Washing: The Rivers are very important for washing clothes and bathing, particularly in Jayanti, where it is readily accessible.
- Fishing and collection of crabs and mollusks. In the hilly tract, however, most fish is bought from Santalabari as few large fish can be found in the rivers there, with the exception of Lepchakha. This is a large river which eventually becomes the Jayanti river. There are many fish here. Fishing activities are most common in late autumn when the river begins to dry and fish can be easily caught from the small pools. Local fishing methods include a net, a hand net and a trap in a small river basin in the hilly tract. In Jayanti, the river is often diverted into a branch channel allowing the collection of fish from the dry bed.
- Plants along the river sides used for medical purposes. Some are sold on the market. The plants are not all genuine wetland plants.
- In Jayanti, the river is important as a site for tourism. There are numerous guesthouses along the river bank, which is a site of natural beauty. It is also a prime spot for viewing animals. The local people therefore get employment in the hotel sector, and as guides for tourists. This can be considered an indirect form of aquatic resource dependence.
- In Jayanti, local people use river water for irrigation also. Some have water directly supplied to them from a pipe, while for those in the forest, water must be carried up.
- There is seasonality to the use of aquatic resources. During the monsoon, local people cannot collect boulders and stones. Transport is also difficult. In the hilly tract, most fishing is done in the late autumn – November- December, when rivers start to dry up. At this time, there are many fish trapped in small pools.
- In Adma, there are rich aquatic resources. However, it appears that fishing is much less common here than in Buxa and Jayanti.
- From the point of view of conservation the situation does not seem to be alarming as the whole emphasis is on protection with restricted access. What possibly is an area of concern is the limited scope of involvement of the local community either in innovative regeneration or optimum utilization of the eco-system services.

### **3.2 Sustainable livelihoods and poverty alleviation in Buxa**

The livelihoods options in the project area are several -natural, physical. Social, financial and the like. Availability of these resources, however, does not guarantee sustainable livelihoods as their access and control over them is restricted. Social capital and network help them negotiate with and put pressure on the state and non-state agencies. Natural resources, as sustainable livelihoods, are mediated by the government policy which do not allow them free and unrestricted access and

control. Sustainable livelihoods options, therefore, are a combination of different assets and skills supported by various initiatives under government policies. Community led initiatives can show examples of livelihoods being optimally harnessed.

Government has a comprehensive poverty alleviation policy emphasizing asset building, imparting skills and training and affirmative action for certain communities for government jobs. Important poverty alleviation programs are Mahatama Gandhi National Rural Employment Guarantee Act (MNREGA) Swarnajayanti Grameen Swarojgar Yojana (SGSY), National Rural Livelihoods Mission (NRLM) and the like. These programs are supposed to reduce poverty.

In the following section we provide an overview of the sustainable livelihoods and poverty alleviation initiatives of the government. These are also relevant for the livelihood report which are presented in the same as well.

**Buxa:**

- Predominance of labouring as a source of income. People labour for the forest department as part of the 100 days work a year scheme under NREGA, for example, repairing roads and trails.
- There is a considerable amount of out-migration, not abroad, but to other urban areas. Many people work in Kolkata, Siliguri and Delhi. Primarily males migrate, but there are some females working in the service sector outside. Jobs include machine operatives in factories and work in hotels.
- In some of the Drukpa villages, people regularly migrate to Bhutan to work. In Lepchakha for example, it was suggested that up to 90% of the local men work as labourers in Bhutan. This opportunity however is reportedly only available to the Drukpa community who know the language and can merge into the local population without official documents. In Bhutan however, they can only get menial work as they do not have citizenship papers.
- Livestock. Goats and cattle in particular. Some households sell the milk outside, otherwise, most sales are within the village.
- Agriculture is limited, given the steep terrain as well as restrictions from the forest department which impedes their ability to cut trees. Nevertheless, there is some maize production in most villages, and some production of cash crops such as garlic, which is sold to merchants in Santalabari. Orange production has declined due to disease and restrictions by the Forest Department. Monkeys reportedly eat the maize crop, adding to the insecurity of farming.

### Jayanti

- Like Buxa, laboring is the primary source of income – both for the forest department, collecting stones for contractors from the river beds, and work in the tourism sector.
- Like Buxa, there is considerable out-migration here to Indian urban centres. MNREGA program has not substantially checked out migration.
- Wild animals make agriculture risky. Elephants regularly trample crops. In Jayanti local people recorded that they rarely farm any more as the risks are so high. There are only some limited fields around Bhutia Busti.

### Adma

- Livelihoods in Adma are vastly different from Buxa and Jayanti. This is an agricultural area. Local people have fields of millet and maize, and there is even some rice in the lower valleys. This community displays a greater level of self-sufficiency than other villages in the Buxa region.
- Livestock is kept primarily for the production of milk products. Milk, yoghurt and cheese are sold in Chunabhatti, for local use and for distribution to urban areas.
- Some people work as labourers, but there is not the culture of out-migration that exists in the other two clusters. Many people work locally for other households in the area, and in Buxa.

The livelihood is semi-nomadic. Most households have large herds of cattle. They tend cattle in the lower valleys at the foot of the plains during the monsoon, when the upper forests are full of leaches. Then in the post monsoon period they are in the forests above and aside the villages. In early winter they return to the villages to harvest the millet, and then in the early spring, they move up to the high ridges on the Bhutan border to tend their herds. They sell cheese, butter, ghee and milk, and sell it to Bhutan, or locally in the surrounding hills.

### 3.3 Relative dependence upon aquatic resources

In all the three project sites people are dependent on the aquatic resources. For example:

- Rivers and ponds are used for several purposes:
- Drinking water. This is piped in from the rivers in most villages. However, in some communities, the wells dry up during the dry season. In Lepchakha for example, they have to walk for two kilometers during this period to collect water from a river. In Adma however, there are no wells, and water must be carried from the river.

- Washing: The Rivers are very important for washing clothes and bathing, particularly in Jayanti, where it is readily accessible.
- Fishing and collection of crabs and mollusks. In the hilly tract, however, most fish is bought from Santalabari as few large fish can be found in the rivers there, with the exception of Lepchakha. This is a large river which eventually becomes the Jayanti river. There are many fish here. Fishing activities are most common in late autumn when the river begins to dry and fish can be easily caught from the small pools. Local fishing methods include a net, a hand net and a trap in a small river basin in the hilly tract. In Jayanti, the river is often diverted into a branch channel allowing the collection of fish from the dry bed.
- Plants along the river sides used for medical purposes. Some are sold on the market. The plants are not all genuine wetland plants (**WP3 field observations**).
- In Jayanti, the river is important as a site for tourism. There are numerous guesthouses along the river bank, which is a site of natural beauty. It is also a prime spot for viewing animals. The local people therefore get employment in the hotel sector, and as guides for tourists. This can be considered an indirect form of aquatic resource dependence.
- In Jayanti, local people use river water for irrigation also. Some have water directly supplied to them from a pipe, while for those in the forest, water must be carried up.
- There is seasonality to the use of aquatic resources. During the monsoon, local people can not collect boulders and stones. Transport is also difficult. In the hilly tract, most fishing is done in the late autumn – November- December, when rivers start to dry up. At this time, there are many fish trapped in small pools.
- In Adma, there are rich aquatic resources. However, it appears that fishing is much less common here than in Buxa and Jayanti.

### **3.3.1 Review of livelihood and development issues in the study area (by gender, age, and stakeholder group)**

In the earlier section (3.2) livelihoods and poverty alleviation issues have been discussed. To avoid repetition this section tries to discuss the issues in the context of gender, age and stakeholders group.

#### **Class relations / rural social structure**

Most of the households in Buxa cluster remain poor, and work predominantly as labourers either outside, for contractors collecting boulders or for the forest department. There are minor sources of accumulation through opening shops and small businesses such as renting rooms to tourists.

Opportunities for accumulation are limited primarily because all land belongs to the forest department. Local people, therefore, have no way of increasing their holdings. The largest differences in wealth can be observed in Adma, whereby there appear to be greater differences between rich and poor based upon the amount of agricultural land one has access to (although holdings can not be expanded) and ownership of livestock, which represents a core source of income. In Jayanti, the tourism sector provides some potential for accumulation, through opening hotels and small businesses. However, accessing capital to invest is problematic. Furthermore, almost all large enterprises have business partners from urban areas, so it is clear that some of the profits flow out of the community.

Given the lack of opportunities for accumulation and the lack of capacity for households to expand their holdings, there is little class differentiation, whereby the poorer households are selling their assets to their richer counterparts. Similarly, few households employ outside labourers, a classic sign of developing rural class relations, although we did witness it occasionally. As there are few sources of accumulation, the primary class relations are therefore between the forest dwelling populations and outside employers.

In terms of gender differences in livelihoods, the levels of discrimination are more limited than in many plains regions and the gendered division of labour is loose. Nevertheless, women play a disproportionate role in household reproductive activities such as the collection of firewood, while some activities such as fishing are primarily the male domain. Regarding age relations, young people play an important role in fishing for species such as crabs and mollusks as well as helping their parents with household reproductive tasks. Nevertheless, there is evidence that as they get older parents prioritise education, reducing their labouring burden. Many young people also migrate for work to urban centres of the plains.

### **3.3.2 Uses and users of aquatic resources in the study site area and identification of stakeholders.**

Drinking, irrigation and washing water: This is piped in from the rivers in most villages. However, in some communities, the wells dry up during the summer season and in Adma there are no wells, and water must be carried from the river. The collection of water is carried out by all family members, although again, women and young people bear a disproportionate responsibility for this task. The rivers are also very important for washing clothes and bathing, particularly in Jayanti, where it is

readily accessible. In Jayanti, local people use river water for irrigation also. Some have water directly supplied to them from a pipe, while for those in the forest, water must be carried up.

**Fishing and collection of crabs and mollusks:** Fishing activities in the hills are most common in late autumn when the river begins to dry and fish can be easily caught from the small pools. Local fishing methods include a net, a hand net and a trap in a small river basin in the hilly tract. In Jayanti, the river is often diverted into a branch channel allowing the collection of fish from the dry bed. Fishing in all the sites is carried out primarily by men and children. Fishing is particularly important for poorer households, for whom fish is a valuable source of protein when vegetables are not available.

**Tourism:** In Jayanti, the river is important as a site for tourism. There are numerous guesthouses along the river bank, which is a site of natural beauty. It is also a prime spot for viewing animals. The local people therefore get employment in the hotel sector, and as guides for tourists. This can be considered an indirect form of aquatic resource dependence.

### **3.3.3 Market influences on aquatic resources in the area**

- **Which aquatic resources are sold?** In Buxa and Adma aquatic resources are not much for the outside market. They are for the domestic personal consumption. Some of the shrubs and leafy aquatic plants are sold in the market in a limited quantity for medicinal as well as for food purposes. But they do not make-up for the substantive livelihoods opportunity. In Jayanti local people catch fish and sell them for income. This happens when the river has water. Sand and stone boulders are excavated but their sale in the open market is not very much allowed. People can, however, use them for their personal domestic use.
- **What is the marketing system?** The marketing system is quite informal and localized. The weekly haat (market) at Santhlabari is the only market in the region where people can sell and buy their produce. Jayanti also has weekly market and there is small scattered market place which organizes regular business activities for the local community. The small traders also bring cosmetic materials from outside. Some of the local community members would also carry their produce to the sub-divisional town of Alipurduar but in very small quantity and in specific items.

### 3.4 Assessment of the strengths and weaknesses of current efforts of protecting biodiversity of aquatic resources in the area

#### 3.4.1 On-going efforts

As has earlier been mentioned the three sites, fall under Buxa Reserved Forest and therefore biodiversity is a priority under the government policy. Regeneration, surveillance, monitoring and regulatory measures are systematically planned and followed. Scientific plantation of different species, surveillance to protect them and strict regulation to stop degradation is regularly done. Some of the programs are supported under different projects while others are done through regular support of the government.

Earlier Buxa Tiger Reserve had the World Bank supported eco-development project which encouraged and supported regeneration and protection initiatives. There was strong community involvement and community was encouraged to undertake different initiatives like intercropping, community based management of water bodies and the like. By providing support for livelihoods opportunities to the local community biotic pressure on the forest and the area was attempted to be reduced. In the central Buxa region community-based fish culture was tried. Tele-farming, an initiative of the FAO (UN) to socialize children into low input organic farming was attempted through a FAO supported program. Currently there is no special program but government is continuing with the protection and surveillance actions. Restrictions on stone mining, fishing etc have been imposed following regulatory measures.

Both stone mining and fishing from the river bed is forbidden for commercial purpose allowing for household consumption. But it is difficult to make clear line between commercial and household needs. This is where the regulations of the state go against the local community.

The **strength** of the government initiative is that it has the sovereign sanction and people tend to follow the norms as their violation attracts penal action. There is also assurance for resources and expert support. The forest department has one of the best trained forest managers and technical experts who ensure scientific management of the conservation process. The government also has the legitimacy to augment its resources and expertise through inter-agency collaboration.

The limitation is bureaucratic functioning of the systems which does not allow flexibility. The system is also time taking and insensitive to the people. The emphasis is over following the process rather than achieving the goal. Initiatives are questioned where as inaction is tolerated which can be

explained using various rules and regulations. The bureaucratic system does not allow much of community involvement and sees any initiative from them with suspicion and distrust. Being target driven the system misses on sustainability. The Government system, working on the sensitive issues like protection and conservation uses a bureaucratic process which does not allow for flexibility for contextual adaptation. For example if a provision allows for the participation of a specific community it would strictly follow that even if a very strong catalyst from other community is available it would not allow the same. If you follow a system and procedure based on direction coming from above you don't relate to the contextual demand and therefore the program gets stuck into non-conductive process and procedure - can not sustain.

### **3.4.2 Cooperation, capacity and performance of implementing agencies in enhancing rural livelihoods and environmental protection in Buxa.**

Enhancing rural livelihoods and environmental protection is the mandate of the government which it must achieve. Combining livelihoods with environmental protection entails functional cooperation and collaboration among various agencies. Consider the following situation:

For Buxa a well meaning government forest officer planned a community fish pond and goat rearing. He organized a series of meetings and discussions with the community which agreed to go for the fish pond. Since Buxa people are not great fish eaters their expertise in rearing and managing the same is limited. An exposure visit is planned to another village. The community members strongly appreciate the plan and agreed to go for it enthusiastically. The forest officer is enthusiastic too but does not have the necessary expertise for fishery. He wrote to the Department of Fisheries for support and it was at this point that the file started moving back and forth. The site visit was organized with great effort but it was too late. The forest officer was transferred and the project got shelved in the first instance and then completely stalled.

This may not be the best livelihood option but this is an initiative showing potential for local level initiatives facilitated by the Government functionaries. during 2003-05

There is capacity within the existing agencies and there is also a sense of cooperation among few willing enthusiastic officials. But the system is complex and time taking with blurred goals. Livelihoods and environmental protection, under the circumstances, takes a back seat.

### **3.4.3 Stakeholder interests, dilemmas and conflicts of sustainable management of aquatic resources in**

There is a long history of conflict with the Forest Department in the selected study villages, and several incidents in particular have further broken down trust:

- There appears to be regular tension with the forest department over their rights to the forest resources. Even children were aware of these disputes. In the focus groups, the children were vocal in their disdain for the FD as much as their parents. When we asked about rules against fishing, one boy replied *“how can they stop us, the river belongs to us, not to the forest department”*. Another man reported during a focus group meeting that *“I do not like the Forest Department. This is our forest and this is our land. I need the land and I need the forest but I do not want the Forest Department!”*. This was followed by an applause from the villagers.
- In Jayanti, local people complained that they were supposed to receive compensation after elephants destroyed their homes, but after several years they have received nothing. We were informed that *“...they are supposed to protect us, but instead they just sleep and do nothing.” (Interview in Bhutia Busti, 22/10)*
- The forest department is putting pressure on the local people in Bhutia Busti to relocate. They are promising to pay 10 lakh rupees, but the local people do not trust this assertion, particularly when compensation for elephant damage in the past has not been distributed. They also do not like the insecurity that they will not have a place to live. Even some political party leaders are putting pressure on the local people to leave, not the local, but the higher level cadre. The local people feel overwhelmed by hostile interest groups *(Interview in Bhutia Busti, 22/10)*.
- Although this can not be verified, there was a perception that the Project Tiger in Buxa is corrupt, and that there are no tigers any more. The locals reported that they had not seen tigers in years, saying that *“we are the only tigers here”*. They think that the FD pretends that there still are tigers so they can continue getting the additional funds that a ‘tiger reserve’ is entitled to, which are siphoned off. It is for this reason they seek to evict people from their land, so they can be shown that they are still trying to ‘protect tigers’. Locals even joked that the FD fake tiger footsteps *(Interview in Jayanti, 22/10)*.
- One of the most notorious episodes of conflict with the FD occurred around the mid 1980s when reportedly the forest department came to the villages around Buxa and cut all the orange trees, despite this having been an orange growing region for generations. The FD informed the villagers that they do not have permission to plant these trees on the forest land. A big group of officials came in their hundreds, and cut down all the trees. They also

reportedly poisoned the soil so trees could not be re-planted. It is for this reason that it is still very hard to grow oranges. Another explanation given by the local community members was that the trees were lost due to attacks by diseases.

Restrictions to 'protect' the biodiversity of the reserve which have been implemented more recently include

- **Restrictions on use of wood:** Local people are allowed into the forest to collect fallen branches dry wood, and fodder but they are not allowed to cut large trees.
- **Restrictions on collection of medicinal plants:** Local people in one of the villages in the hilly tract were aware that there was a lot of money to be made in harvesting medicinal plants from the jungle such as *totala* and *pippla*. Many of these are found along river banks. However, they reported that the forest department does not allow this (*interview in Lepchakha, 11/10*)
- **Restrictions on boulder collection:** The Department of Forestry had previously banned the collection of boulders from the river. However, a few years ago they allowed trucks in again. Although the profits are drained to urban centres by contractors, it was still a source of income for the local people. Currently, contractors do not need permission to collect stones from the vicinity of Jayanti, but they require clearance if they want to go deeper into the forest.
- **Restrictions on tourism:** There were 21 households in Jayanti who had members working as guides for the many domestic tourists who visit the reserve each year. However, the FD is cracking down on tourism in the reserve. Already a number of the core roads for vehicle safaris have been closed to the public.
- **Restrictions on development activity in the reserve:** potential methods of utilising aquatic resources have not been mobilised due to restrictions. For example, there is the potential for a micro-hydro, fish ponds etc, but local people felt that the FD would never allow these activities. More information needed on specific restrictions on construction within the reserve.

- **Restrictions on fishing:** Technically, the local people in Jayanti reported that they were not allowed to fish. In the past, they were fined and even beaten by forest guards for fishing. However, the officials turn a blind eye and fishing is tolerated.
- **Cultural restrictions:** There are some local restrictions not connected to the government, such as the restrictions on fishing in the small *pokhari* (pond) above Jayanti. There are rich fish resources but it is a religious site.

#### 4.0 Conclusions

This section summarises the main institutional issues, opportunities and constraints for addressing the governance challenges of effective conservation of the biodiversity of aquatic resources in the High ARCS study site within Buxa Tiger Reserve.

With the signing of the international treaty on biodiversity India and by corollary West Bengal and Buxa have committed to achieve the biodiversity goals. The exiting institutional framework, however, is faced with serious issues of missing sensitivity and enabling process. Biodiversity is to be protected to ensure wellbeing of the people and all other living beings. This critical consideration is lost in the '**craving for numbers**' as adopted by the state agencies.

The conservation goal is assigned to be achieved by a bureaucratic system where a sensitive humane face is missing. Although the Biodiversity Act (2002) advocates for the involvement of the local communities and civil society their involvement is cosmetic and notional. Local community is seen with suspicion and distrust and kept at a distance. The community and civil society also prefer to maintain indifference as the Act is quite stringent to the violators. It is easy to implicate anybody even on the flimsiest ground. Forest protection committees and other users committees are notional in their involvement and they are often co-opted. There are several studies suggesting this plus the main author's own understanding while working on the Forest protection Committees. Actually, the personal understanding of the author is that where ever communities have been active in protecting the forest it has been quite effective. But according to the Participatory Forest management provisions the local forest officer becomes the ex-officio member secretary of the committee and continues with his bureaucratic orientation.

The community or stakeholders' involvement is reflected through 'official' users' groups. These groups are invariably either co-opted or concocted representation of various stakeholders. As such stakeholders' aspirations and priorities are hardly ever represented. Such groups are also mechanical in their functioning. The challenge is to evolve stakeholders' involvement which does not seem to be possible under the given dominance of the state. Some small local initiatives portraying the collaboration among different stakeholders, however, offer windows for hope for their replication.

The ethnic composition of the local community, who are quite close to the nature, can act proactively toward the conservation of biodiversity if the state allows and solicits their support. Since their livelihoods are dependent on the local ecosystem services they can make their creative contributions profoundly. During the focused group discussions the men women and children offered enough credence to their willingness in conserving the bio-diversity if the state trusted them for their proactive actions. The avoidable hostility which is created by unfound considerations can be replaced by constructive engagement. For example, during the Eco-development project the community worked hand in hand closely to ensure that local biodiversity was not tempered with and there was a collective effort toward conservation. Scores of examples show that the community has worked on intercropping and alternative fuel programs to reduce pressure on the eco-system services. Buxa has not shown any example of the community flouting the biodiversity norms while organizing rural tourism or any other activity.

To conclude biodiversity in Buxa region is a factor of perceived conflict between the community and the State and inadequacy of institutional and policy support to reduce the conflict. The HighARCS project, based on its analysis of the current situation, has been evolving definite mechanism in an action research format to test the efficacy of appropriate institutional strategy and policy perspectives to help conserve biodiversity and augment livelihoods opportunity for the poor community. Integrated Action Planning(IAP) in conjunction with the range of stakeholders and local communities may promote conservation and sustainable use of highland aquatic resources and biodiversity.

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#### **Annexure -1 : List of stakeholders**

1. Gram Panchayat of Rajbhatkhaba
2. Village Development Committee
3. Buxa Shiksha Jyoti Abhiyan
4. Members of the self-help groups
5. Range and beat officers
6. Field Director –Buxa Tiger Reserve
7. Sabhadhipati of Jalpaiguri
8. District Magistrate of Jalpaiguri
9. Additional District Magistrate of Jalpaiguri
10. Deputy Director of Fisheries
11. SSB –Para military boarder security
12. Teachers from Buxa
13. Birth attendants from Buxa
14. Officers from the Agriculture Department
15. Officials from Public Health Engineering