Identifying Stakeholders in the Ganges Basin to Reconcile Conservation and Competing Land Uses and Processes in the Landscape

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ABSTRACT

The Ganges basin is the largest river basin in India. It is a source of surface water and other bio-physical resources and ecosystem services for socio-economic well-being in the basin.

Due to intensive agriculture and habitation use, and reduction in forest cover and water coverage, water, land and bio-resources are under tremendous pressure; biodiversity conservation and maintenance of ecological integrity in the basin has become a challenge. Fish resources are depleting and many wild animal species are under threat.

Landscape approach is considered as a suitable means to achieve conservation goals and meet the arduous task of feeding the population. The approach requires identification and analysis of stakeholders for a workable level of agreement among them.

The paper attempts to identify and analyse the stakeholders in the basin to achieve the goal of biodiversity and environment conservation in a multi-stakeholder scenario.

Keywords: Ganges basin, biodiversity conservation, landscape approach, stakeholder, stakeholder analysis

INTRODUCTION

Land-uses and Processes in the Ganges Basin

Ganges basin is the largest landscape in the country characterised by interacting ecosystems and human interference. It is the largest river basin in India in terms of catchment area (NRCD/ MoEF 2009). It is spread across approximately 1.09 million square kilometres in India, China, Nepal and Bangladesh. Rivers in the Ganges basin are not only an important source of surface water but also an array of bio-physical resources and ecosystem services crucial for socio-economic well being of the inhabitants in eleven Indian states situated in the basin.

Approximately 79 per cent of the total basin (~0.86 million km^2) extends only in India and occupies about 26 per cent of the total geographical area of the country. The region is densely populated (423 inhabitants km^{-2}) and holds 478 million people of the total 1181 million population of India; some 100

million are directly dependent on the river and its tributaries (World Bank 2010; GRBEMP 2011). It has been estimated that human population in the basin would grow to over one billion by 2030 (Markandya and Murty 2000).

About 62 per cent land in the basin is cultivable land; 16 per cent is covered under forest, 14 per cent is not available for cultivation, and eight per cent is fallow land. In the Ganges basin states, areas under rivers and streams and riverine wetlands are 25236 and 736 square kilometre respectively. Drainage area of these water bodies is 861404 square kilometre (NWA 2011).

There are 27 national parks and 75 wildlife sanctuaries preserving the flora and fauna in-situ. As per 2001 census, there were 1949 towns and cities, of which 337 were under Class-I (population over 100000) and Class-II (population between 50000-100000) categories, located in the basin where approximately 124 million people reside (Anon. 2011). Of the country's total cultivable land, 46 per cent lies within the Ganges basin states which sustains 43 per cent population of the country; average cropping intensity is as high as 147 per cent against the national average of 139 per cent. Availability of irrigation sources and fertile soil are key factors behind this (Anon. 2011).

The quest for deriving high yield from the limited resources results in the exhaustion and overexploitation of resources on one hand and alteration of environmental conditions on the other. Environmental degradation further affects the socio-economic conditions in the basin. Intensive use of chemical fertiliser and pesticide in agriculture sector leads to high level of nutrients and pesticide residues into surface water bodies in the basin through agricultural runoff. It has been estimated that up to 15 per cent of the nutrients added to the soil reaches into surface water systems. Nutrients in surface water and ground water can affect human and aquatic organisms that rely on water for consumption and habitat (Easton and Petrovic 2004).

Water is withdrawn from the rivers for irrigation and energy generation through 12 major diversions/ storage projects, and 11 hydroelectric storage projects, respectively (http://india-wris.nrsc.gov.in/wrpinfo/index.php?title=Water_Resources_Projects_In_India) in the basin. The water development projects both have direct and indirect impact on the basin's socio-ecological environment. It leads to inundation of forestland and loss of biodiversity; loss of soil fertility; displacement of people; development of seismicity etc. (Rahman et al. 2010).

Apart from withdrawal of water through these projects, rivers receive refuse from cities, towns, industrial houses in the basin (NRCD/ MoEF 2009). The river banks and floodplains are also encroached upon for quarrying, agriculture, establishment of brick kilns and illegal constructions on the floodplains of rivers. Satellite-based studies have revealed that the Ganges basin had been undergoing rapid land-use change; in the last three decades, agriculture and habitation use has increased while forest area has been reduced (Behera et al. 2014).

BIODIVERSITY CONSERVATION IN THE PRESENT LAND-USE SCENARIO

Rivers are central elements in many landscapes. They are important natural corridors for the flow of energy, matter and species, and are often key elements in the regulation and maintenance of landscape biodiversity (Malanson 1993).

Most of the activities and processes undergoing in the basin directly affect the goals of preservation of natural systems in general and biodiversity conservation in particular. Due to the increased rate of water abstraction, measurable shift in hydrology and water quality of the river, and over exploitation of fish resources, fisheries in the Ganges have diminished, fish catch has declined and fish species composition has changed (Vass et al. 2010).

As per CIFRI (1996), of the total landing of fish, only 29.8 per cent were sourced from riverine sources

while rest from other water bodies. Water abstraction projects have pronounced effect on the flow of rivers in the basin. Reduced flow lessens the silt carrying capacity of river resulting in enhanced sedimentation, which adversely affects the fish breeding grounds ultimately affecting fish catch and diversity.

Dams and barrages act as physical barriers and adversely affect migration of species. An anadromous fish such as Hilsa (*Tenualosa ilisha*), a commercially important Indian Shad, has registered a drastic decline in catch in middle reaches of the Ganges after commissioning of the Farakka Barrage in the lower reaches of the river in 1975 (Sinha et al. 1996). Recent construction of large number of hydroelectric projects on the rivers in the Himalayan region has resulted in habitat loss, barrier for movement of fish and other aquatic species, changes in sedimentation flows, alteration in environmental flows and changes in nutrient flows, affecting the biodiversity and natural processes critically important for maintaining them.

Rajavanshi et al. (2012) emphasised protecting the river segments with threatened fish species and critical habitats found nowhere else in the basin should be protected from dams or other potentially damaging civil works. All these interferences have made the riverine ecosystems most threatened among all the aquatic bodies in India (Singh and Singh 2007).

Due to forest loss, deterioration in water quality and flow, and other anthropogenic factors several species in the basin have become endangered. Royal Bengal Tiger (*Panthera tigeris tigris*), Vulture (*Gyps* spp.), Gangetic Dolphin (*Platanista gangetica gangetica*), Gharial (*Gavialis gangeticus*), Ganges Shark (*Glyphis gangeticus*), River Terrapin (*Batagur baska*), Bengal Roof Turtle (*Batagur kachuga*), and Bengal Florican (*Houbaropis bengalensis*) are struggling for survival in their habitat (MoEF 2011).

Shrinkage in forest cover and water expanse in the Ganges basin which leads to biodiversity loss is primarily due to increased agriculture and urbanisation. It is evident from a recent study on changes in land-use class in the basin (Behera et al. 2014). According to the study, agricultural expansion and built-up land were the significant reasons for loss in forest area in the Indian portion of the Ganges basin during 1975 and 2010.

Coverage under forest plantations has increased but a marked decrease in natural forests, mangroves, scrubland, wasteland and water body has taken place. An increment of 45.03 per cent in built-up land class has been recorded during the period. Most of the forest cover has been converted to agriculture land and built up area.

KEY PROBLEMS AND WAY AHEAD

Food production to feed the burgeoning population is one of the key issues affecting the land-uses and environment worldwide. The problem is quite evident in the Ganges basin as discussed in the earlier section. Though, farming is the basis of civilisation, it is more damaging to nature than any other sector of human activity and expansion, and intensification of the sector threatens ecological goods and services (Balmford et al. 2012; MEA 2005).

It has been predicted that continuing population and food consumption growth will mean that global demand for food will increase till roughly the middle of the century and growing competition for land, water, and energy, in addition to the overexploitation of fisheries, will affect our ability to produce food, as will the urgent requirement to reduce the impact of the food system on the environment (Godfray et al. 2010). In the existing scenario in the Ganges basin, biodiversity conservation and environmental protection is a challenging task indeed.

In developed countries, biodiversity goals are achieved through a mix of total protection complemented by a broad spectrum of environmental restrictions on the use of non-protected land (Bennet et al. 2006). Conservation interventions are made across the entire landscape and conservation is just one among several management goals

(Philipps 2002). The composition of the portfolio of conservation approaches differs according to a country's stage of economic development, population density and culture (Sayer 2009). Similar, landscape approaches are now used to achieve conservation goals in developing countries where there is a need to address trade-offs between conservation and local livelihoods (Sayer and Campbell 2004).

These approaches assume that the landscape is the appropriate scale for reconciling these trade-offs. However, such approaches may not deliver effectively on either alleviating poverty or on conserving biodiversity (McShane and Wells 2004). Effects of climate change on regional crop production, competing demands on land for climate change mitigation, biodiversity conservation, and agriculture implies trade-offs, many of which are poorly understood and not easily resolvable (Lobell et al. 2011; Sandker et al. 2012). Thus, Sayer et al. (2013) opine that there is no single best answer to the problem, and societies will have to confront challenges that transcend traditional agricultural and environmental boundaries.

This necessitates that people and societies must make decisions, quality of which is a function of the process by which decision is reached, and achieving objectives is an ongoing process of negotiation, learning, adaptation, and improvement. This requires decision makings with landscape approaches, which have gained importance for searching solutions to reconcile conservation and development (Sayer 2009). The scope of the term 'Landscape' in the present days has changed from focused biophysical (Noss 1983) and visual/ scenic attributes (Franklin 1993) to an arena in which entities including humans interact according to physical, biological, and social rules that determine their relationships and it is defined in broader conceptual terms rather than simply as a physical space (Farina 2000).

The Convention on Biological Diversity (CBD 2011) recommends that the landscape level is an appropriate spatial scale for improving the coordination between relevant policies and sectors, as multiple land-use forms such as settlements, transport infrastructure, agriculture, forestry, mining, hunting, and conservation often co-exist (and compete for limited natural resources) within the same landscape. It is also an important planning scale for considerations of ecosystem resilience (Thomson et al. 2009).

The US Department of Interior: Bureau of Land Management (http://www.blm.gov /wo/st/en/ prog/ more/Landscape_Approach/landscapequestions. html#howdef) explains "Landscape Approach" as an approach that looks across large, connected geographic areas to allow for recognition of natural resource conditions and trends, natural and human influences, and opportunities for resource conservation, restoration and development.

It seeks to identify important ecological values and patterns of environmental change that may not be evident when managing smaller, local land areas. Also, it provides a framework for integrating science with management and co-ordinating management efforts and directing resources where they are most needed. Sayer et al. (2013) provided 10 summary principles to support implementation of a landscape approach as it is currently interpreted.

These principles emphasise adaptive management, stakeholder involvement and multiple objectives, which differ from more traditional sectoral and project-based approaches. The multi-stakeholder principle, one of the 10 principles in Landscape Approach, requires engagement from a representative set of stakeholders, and negotiation towards a workable level of agreement among them about goals concerning issues and resources of common concern from the landscape and ways of reaching them.

Developing a stakeholder platform requires a patient iterative process of identifying stakeholders, their interests, building trust, empowering weak stakeholders and, for powerful stakeholders, to accept new rights and roles for other stakeholders (CBD

2011). In a landscape approach, all stakeholders need to understand and accept the general logic, legitimacy and justification for a course of action, and to be aware of the risks and uncertainties; building and maintaining such a consensus is a fundamental goal of it (Sayer et al. 2013).

Keeping in view the importance of stakeholder identification for landscape level solutions in the Ganges basin, the present paper attempts to identify the stakeholders which could be useful for developing strategies and mobilising activities for reconciliation of land uses competing with biodiversity conservation. The paper holds importance since very scanty information is available on stakeholder identification in the Ganges basin. The paper seeks to fill in such a gap.

MEANING AND IMPORTANCE OF STAKEHOLDERS

The Merriam-Webster dictionary defines "stakeholder" as: a person entrusted with the stakes of bettors; one that has a stake in an enterprise; and one who is involved in or affected by a course of action.

Grimble et al. (1995) defined the term as: "all those who affect, and/ or are affected by the policies, decisions and actions of the system. They can be individuals, communities, social groups or institutions of any size, aggregation or level in society."

When the term implies in Landscape Approach, a stakeholder can be "an individual, group or institution having a specific stake in the landscape, and who is (in)directly affecting or affected by any decision concerning the landscape."

Thus, stakeholders may not necessarily be physically present in the landscape. The stakes may include a product (fuel, timber, crop, fish, water, wood etc.), interest (benefit, profit, influence, power etc.), a service (recreation, biodiversity conservation, scenic beauty etc), or anything, to which a particular value is attached.

METHODS FOR STAKEHOLDER ANALYSIS

In policy development and natural resource management, stakeholder analysis is seen as an approach to empower marginal stakeholders to influence decision making processes (Reed et al. 2009). Lindenberg and Crosby (1981) suggested making an inventory of those who could have role in decision-making, gauging their importance through their level of influence and their interest for a particular outcome.

In the Landscape Approach, it is a methodology for understanding a landscape's dynamics by identifying the key actors directly or indirectly related to the landscape, and assessing their respective roles (interests, influences, rights, duties) in the landscape.

In the present paper, stakeholder analysis was used to better understand its perspective in the Ganges basin. Objectives of the analysis were to:
1.   Identify the stakeholders, and
2.   Categorise the stakeholders.

The overall purpose of the paper is to provide analytical support to an on-going process of uses, conflict resolution and management of resources crucial for biodiversity conservation in Ganges basin.

Methods followed to meet the objectives were as below.
a.   **Rich picture:** A hand drawn diagram (rich picture) was created to illustrate the main elements and relationships that need to be considered in trying to intervene to create improvement in biodiversity conservation prospects, and illustrate richness and complexity of the situation in the basin. Structures, people, land-use, natural elements, conflict and stakes in the basin were depicted using diagrams and words. While preparing the rich picture, due care was taken to avoid structuring the situation in a logic model or

process chain, and truly reflect the scenario as much as possible without privileging, predetermining, or presuming a particular point of view.

b. **Identification and categorisation of stakeholders:** Stakeholders in the Ganges basin were listed by analysing the rich picture, personal observations and experiences, literature review, and media reports. While identifying the stakeholders following guiding questions were kept in mind based on IIED (2005).

- Who are the potential beneficiaries?
- Who are adversely affected?
- Who has existing rights?
- Who is voiceless?
- Who resent to changes and mobilise resistance?
- Who is responsible for planning?
- Who has money, skill or key information?
- Whose behaviour has to change for success?

The identified stakeholders were first organised on the basis of macro to micro continuum to classify the stakeholders at different levels and identify their interest. Micro-level stakeholders are those who are immediate users and *de facto* managers of the basin resources, while macro-level stakeholders are the groups/ macro planners concerned with regional or national resource and development issues. The continuum levels, from macro to micro level, used in the study were global and wider society, national, regional, local off-site and local on-site (Grimble et al. 1995).

Stakeholders were further categorised into primary, secondary and tertiary depending on an assessment of whether they are immediately affected, or can immediately affect the biodiversity conservation in the Ganges basin. For this, top-down analytical categorisation of the identified stakeholders was done based on observations (Dryzek and Berejikian 1993). Stakeholders in different categories were

represented through a simple diagram of concentric circles.

Next level categorisation was done using Interest-Influence matrix displaying the attributes and interrelationship of the stakeholders. The analysis tried to identify the stakeholders with "interest" in and "influence" over the opinion making in the resource uses issues in the landscape.

Based on the analysis the stakeholders were classified into:

a. Who can make difference (Key players)
b. Who need to be made more responsible (Context setters)
c. Bystander group (Crowd)
d. Victim group (Subjects) (Eden and Ackermann 1998; De Lopez 2001).

RESULTS AND DISCUSSION
Rich Picture of the Ganges Basin
Rich picture of the Ganges basin illustrates main elements and their interrelationships in the basin. It also helped in identifying various goods and services connecting the biophysical attributes of the Ganges system and human benefits in the river basin (Figure 1).

The goods and services are not homogenously distributed over the landscape. The amount of service supply depends on location-specific and temporal landscape characteristics (Wiggering et al. 2006; Egoh et al. 2008). It also portrays the threat elements operational in the basin such as deforestation and dams in upper reaches, exploitation of biological resources, disposal of wastes, human settlements in the floodplains etc. As depicted, the landscape has multiple values (tourism, biodiversity, religious sentiments etc), goods (forests, fertile farmland, fishing ground, water for irrigation, human and industrial uses etc), and myriad of services (waterways, recharging of wetlands, dilution of pollutants etc).
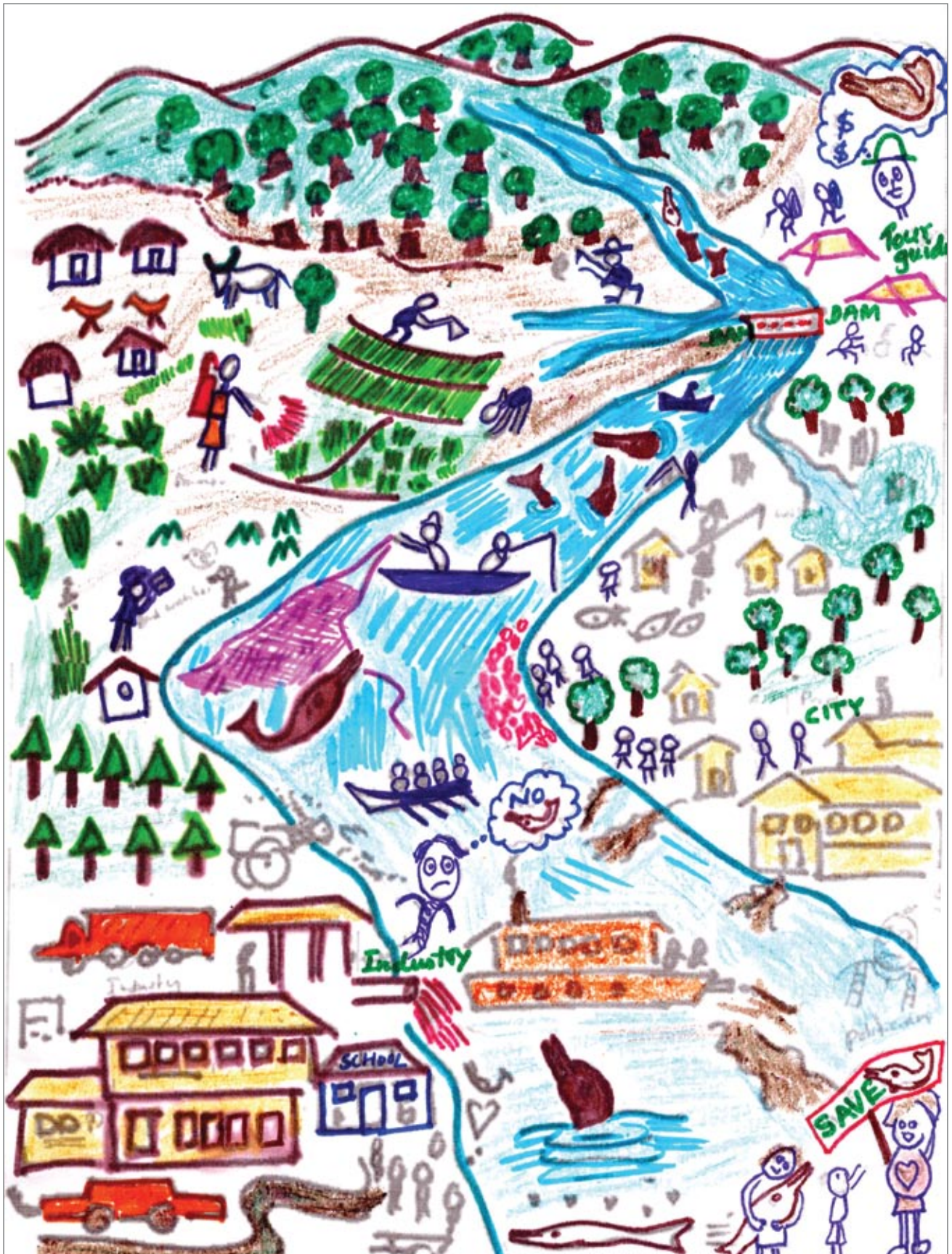
Figure 1: Rich picture of the Ganges basin and illustrating richness and complexity of the situation in the basin ©Samir Kumar Sinha & Enoka Priyadarshani Kudavidanage

Apart from these values, there exists a connectivity of systems (farming connected with river flow, wetlands connected with river, upland forests connected with lowland farming). The basin provides more than one service at a time viz. agricultural production, facilitating tourism and recreational activities, providing habitat for wildlife, supporting fisheries etc thus making the Ganges basin a multifunctional landscape.

STAKEHOLDER IDENTIFICATION AND CATEGORISATION

Stakeholders on a Macro-micro Continuum
The stakeholders were identified and organised on a macro-micro continuum. Interest of stakeholders at local on-site continuum is in direct use of the basin resources, be it water, physical or biological resources or the aesthetic values attached with river and its floodplain, thus forming the micro continuum level, while the macro level continuum includes wider society like international agencies and common interested mass (Table 1). All stakeholders lie somewhere along the continuum mostly as per their interest in the uses of various resources or values of the Ganges basin.

Stakeholders at Different Levels
Based on the fact that whether a stakeholder will be immediately affected, or can immediately affect the biodiversity conservation in the Ganges basin, they were grouped into primary, secondary and tertiary.

Table 1: Ganges basin stakeholders on a macro to micro continuum

Continuum Level	Stakeholders	Interest of stakeholders
Global and wider society	• International agencies/ bodies like IUCN, CBD, CITES, World Bank etc. • Common interested mass	• Biodiversity conservation • Environmental sustainability • Livelihood of people • Cultural values
National	• Central government / agencies • National Ganga River Basin Authority (NGRBA) • National Mission for Clean Ganga (NMCG) • Researchers • Civil society organization (NGOs) • Politicians • Waterways authorities	•Tourism • Policy formulation • Ecosystem restoration • Biodiversity conservation • Advocacy and awareness • Policy for Water development work • Policy for Waterways development
Regional	• Government Departments (Water Resources, Fisheries, Mining, Urban Development) • Media • Agribusiness sector • Real estate sector • Protected areas	• Water use • Fish resource exploitation • Promotion of intensive farming • Issue identification and highlighting • Construction activities in floodplain
Local off-site	• Farmers • Wetland users • Fishermen societies • Religious institutions • Village institutions • Municipal bodies • Industries	• Water and land use • Regulating the resource uses • Conflict resolution • Water supply • Waste disposal
Local on-site	• Riverine fishing community • Sand miners • Water development sector • Tourism • Riparian farmers	• Sand and other physical resources • Fishing and aquaculture • Maintenance of water level • Water diversion and use • Cultural and natural scenic beauty sites

As per the analysis, sand miners, real estate sector, riparian farmers, water ways authorities, riverine fishing communities, tourists, industries, wetland users, municipal bodies and water development agencies are the primary stakeholders.

In addition to the primary stakeholders with rights, powers or direct impacts related to the river resources, the biodiversity conservation issues in the landscape have far-reaching impacts. Thus, the secondary stakeholders include the societal components having legitimate interest and long term effect (Figure 2). For example, to prevent the river from getting nutrient-loaded and ensure maintenance of the ecosystem, use of chemical fertilisers needs to be minimised, which will have long-term bearing on the agribusiness sector.

International agencies, National Ganga River Basin Authority (NGRBA), National Mission for Clean Ganga (NMCG), politicians, common interested mass, government departments and religious institutions are tertiary stakeholders, with interest in biodiversity conservation and ecosystem functioning in the basin, but they are not the group who are directly or indirectly impacted by the measures undertaken for the conservation of the Ganges basin (Figure 2).

Interest and Influence of Stakeholders

Interest-influence matrix helped in categorisation of stakeholders (Figure 3) in the Ganges basin in a manner to engage them in meeting the objectives of the landscape approach of biodiversity conservation. "Interest" of the stakeholder was identified in terms of goods and services provided by the regulating, production, habitat, carrier, and information functions of the basin.
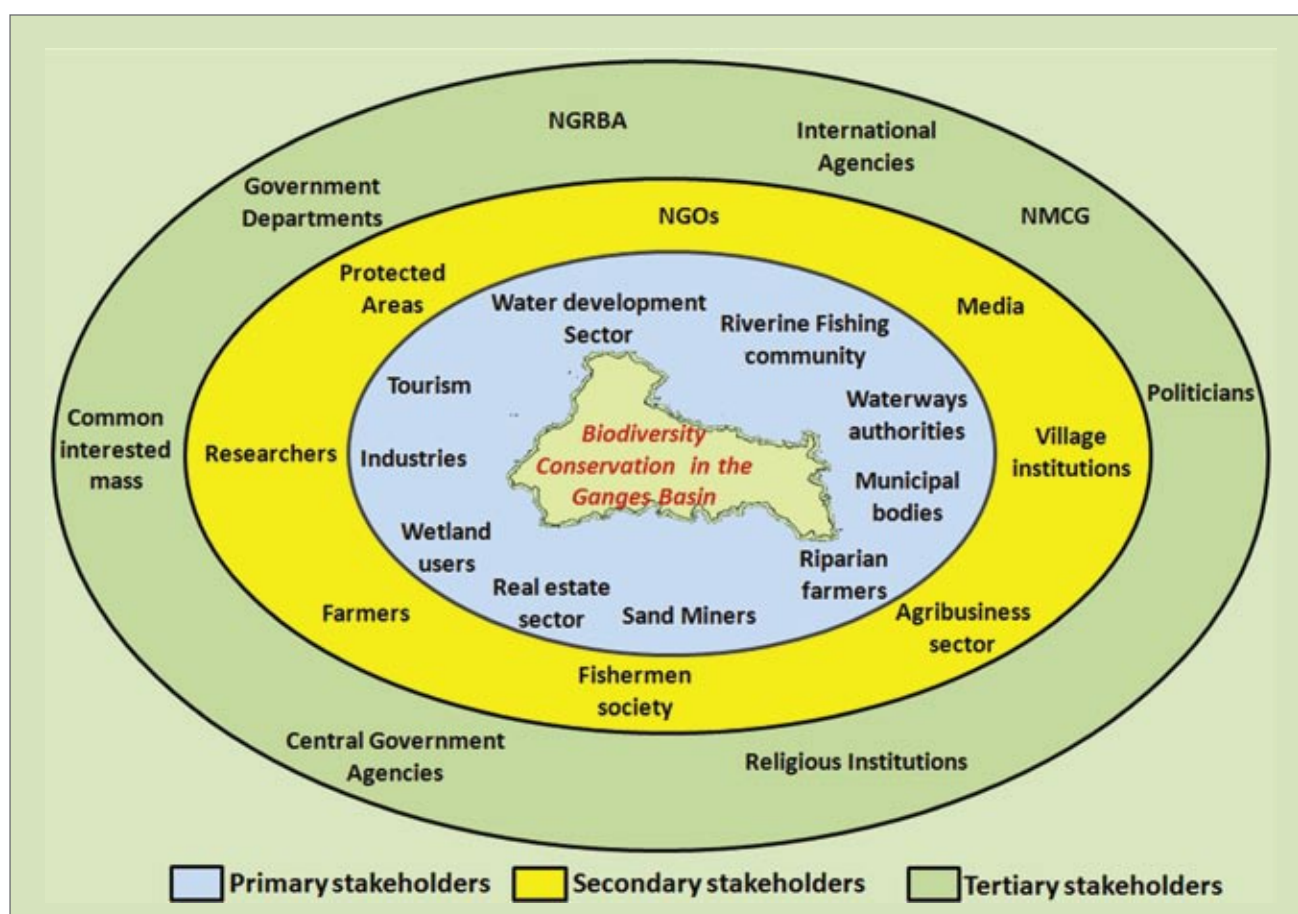

Figure 2: Levels of stakeholders in Ganges basin conservation

Since the capacity for "influence" is dependent on "power" (Nelson and Quick 1994) which could be coercive, utilitarian and normative (Etzioni 1964).

Galbraith (1983) described three sources of power: condign (influence through emotional, financial and physical threats and punishment), compensatory (influence through symbolic, financial and material rewards, such as salaries, bribes or gifts), and conditioning (works through manipulation of belief through cultural norms, education, advertising, propaganda).

The group of stakeholders having high interest and influence over the issues of conservation of the basin (international agencies, NMCG, NGRBA, politicians, central government agencies, researchers and protected areas) should be actively persuaded and used to address the cause. The group of stakeholders with high influence and little interest should be monitored and managed through appropriate processes of negotiation and building consensus to use their influences to achieve the goals. For example, religious institutions have great influence over common masses and they have a large number of followers, but ecosystem conservation might not be their priority. Engaging them in conservation pursuit shall build opinion and kick off conservation actions involving the mass the institutions lead.

Victims are the groups having high interest but low influence, thus their impact is minimal. However, they can be empowered by developing alliance and complement other stakeholders' efforts (Reed et al. 2009). The stakeholders with low influence and low interest (waterways authorities, municipal bodies, farmers and riparian farmers) may not be taken much into account while engaging the stakeholders for desired change.
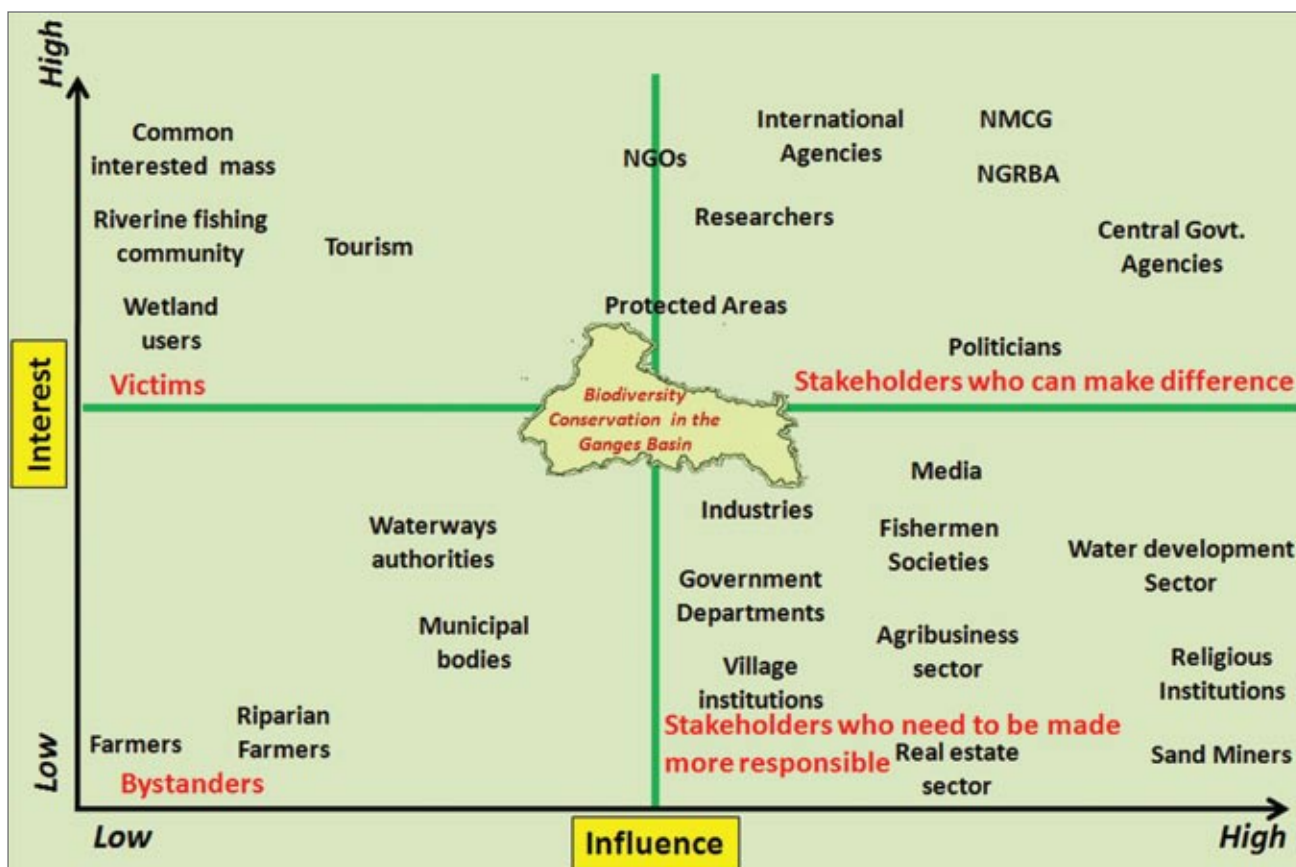

Figure 3: Stakeholders' interest-influence matrix for biodiversity conservation in the Ganges basin

CONSERVATION IMPLICATIONS OF LANDSCAPE APPROACH AND STAKEHOLDER ANALYSIS

As mentioned in earlier sections, landscape approaches seems to be an appropriate scale to achieve conservation goals in developing countries, but stakeholders, including conservationists, need to recognise that working at landscape levels inherently changes how we look at the outcomes of our interventions. The straightforward concepts of success and failure become ambiguous in a multiple-stakeholder context in which someone's gain is someone else's loss. Changes in one component of the landscape, even if desired, can have unintended and undesirable repercussions (Phalan et al. 2011).

Landscape approaches, therefore, demand an open-minded view of outcomes and acknowledgment of the tradeoffs likely to be involved in any system change (Sunderland et al. 2007). Such compromises require decision-makers to consider all stakeholders and to work towards their inclusion in the processes (Sayer et al. 2013).

Many efforts of environmental management fail because they pay inadequate attention to the various stakeholders involved and their particular interest. Stakeholder analysis helps us in understanding the objectives and interests of various stakeholders managing and using the environment (Grimble et al. 1995).

In a multiple stakeholder scenario, the stakeholders frame and express objectives in different ways as per their stake and interest. Failure to involve them in equitable manner in decision-making processes leads to sub-optimal, and sometimes unethical, outcomes. Thus, recognition and identification of concerns of stakeholders is much required in landscape approach (Sayer et al. 2013). However, in the Ganges basin most of the actions to restore the ecological integrity of the landscape are restricted to pollution abatement programs (NRCD/ MoEF 2009) and no detailed analysis of stakeholders has been done.

Recently, the National Ganga River Basin Authority, constituted in 2009 for comprehensive management of the river Ganges has developed Environmental and Social Management Framework for implementation of river water quality improvement project in selected states of India (Anon. 2011).

The framework has identified government departments, research institutions, and non-government and civil society organisations located in different states as key stakeholders for the project. Here, the stakeholder identification completely missed out the primary stakeholders who are the immediately affected or the first who affect the ecological integrity of the river (as described in earlier section of the paper). Effective participation of stakeholders is the key to success of such programmes.

The present paper endeavours to plug the gaps by identifying various stakeholders and analysing their concerns in a landscape perspective. This analysis shall help in looking at the issue of land-use pattern competing with the ecological integrity of the Ganges basin in a holistic manner.

The paper will also be useful further in identifying the stakeholders' relationship to sort out conflicting issues, developing communication strategies for them, strengthening their capacity, and also framing development and conservation goals to address growing pressure on natural resources in the Ganges basin and to accommodate the needs of present and future generations.

It is also highlighted here that stakeholders and their concerns are not static but dynamic, thus identifying stakeholders and recognising their concerns and aspirations is an iterative process. However, many agencies aspire to involve all stakeholder groups in decision making, but the transaction costs of doing this comprehensively can be prohibitive and total agreement can be elusive (Balint et al. 2011).

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