

Chapter -II

WETLANDS CONSERVATION: METHODS, FUNCTIONS, USES AND VALUES

2.1 Introduction

'Value' is an anthropocentric concept as it depends upon the perception or judgment of the human society about the usefulness of something. The goods and services provided by an ecosystem are then considered as values. All values are derived from the functions performed by an ecosystem. All wetlands perform certain functions and hence, have some values. Some times, these functions and values are considered interchangeably. It must be stressed however that all kinds of wetlands do not perform all possible functions, and therefore do not have similar values. The functions depend upon the location, size and various ecosystem, characteristics of the wetland, and also upon the nature and degree of human intervention. Functions of an ecosystem are ecological attributes resulting from the interaction between its physical, chemical and biological components. These interactions result in the creation of a variety of niches, which are occupied by various organisms thus providing a habitat to plants, animals and microorganism, is an ecosystem function. Besides the foregoing quantifiable and consumptive values, wetlands also have an important non-consumptive value. It lies in their providing aesthetic setting for cultural and recreational activities such as swimming, fishing, canoeing or bird watching or just relaxing and marveling at nature's beauty. Poets and artists all over the world have been inspired by wetlands in many of their works. Wetlands are also natural laboratories for teaching and research.¹

Some values of wetlands can be expressed in monetary terms. The flood control value of a wetland is one of which engineers and economists can calculate a monetary value in terms of avoided downstream damage to homes, agricultural land, bridges etc. Wetlands that are on the Ramsar list of International importance often provide habitat for wild life whose value is not expressed in monetary terms but whose aesthetic and biological diversity value is nonetheless recognized world -wide.²

¹ Refer; Gopal.B "Wetlands Functions and Values" Article published in WWF-India's Handbook of Wetland Management ,published by Wetlands Division, WWF -India,(1995),p.30-35.

² Refer: J.S. Larson Article on "Identifying the functions and values of fresh water wetlands"- published in WWF-India's Handbook of Wetland Management, published by Wetlands Division, WWF- India, (1995) p.74-75.

In view of understanding the utility of wetlands, the attempt made by the Ramsar authority as well as the strategy evolved by the scientists and other agencies are covered in this chapter. The legal, scientific, economical and cultural values of wetlands are the central issues being addressed.

The Ramsar Convention preamble recognizes the “fundamental ecological functions of wetlands as regulators of water regimes and as habitats supporting a characteristic flora and fauna, especially Water fowl”. The ambitious aim of the Convention is “to stem the progressive encroachment on and loss of wetlands now and future” and to support wetland conservation “by combining far-sighted national policies with coordinated international action”. The Contracting Parties are bound by three main groups of obligations which, consistently with Ramsar’s very broad definition of wetlands, apply equally to inland and coastal wetlands and water systems. They are as follows;

- i) Site-specific measures: To designate one or more suitable wetlands of international importance for inclusion in the list of wetlands of importance.(Art.2), to promote the conservation of listed wetlands(Art.3.1) and to establish nature reserves on wetlands and provide adequately for their wardening. (Art.4.1);
- ii) Non-Site -Specific: To formulate and implement their planning so as to promote, as far as possible, the “wise use” of wetlands in their territory (Art.3.1);
- iii) International cooperation: To consult with other parties about implementing obligations arising under the convention in respect of transboundary wetlands, shared watercourses and coordinated conservation of wetland flora and fauna (Art.5);Article.4 generally requires parties to encourage wetland research, to endeavor to increase water fowl populations on wetlands and to promote the training of personnel.

The combination of localized, general and international measures is of particular interest. Whereas area-based conservation mechanisms were already well established in international and national law, the open-ended concepts of wise use and multi-faceted transboundary cooperation were more pioneering.³

The National policy and practice towards the conservation of wetlands varies from one Country to the other. Some Countries, which have ratified the Ramsar

³Clare Shine and Cyrille de Klemm (1999) *Wetlands, Water and the Law-Using law to advance wetland conservation and wise use*. IUCN, Gland, Switzerland. P.29

Convention, have no legally backed definition of wetlands, whilst the Countries like Spain and Uganda have incorporated the Ramsar definition into national legislation with out any modification. Costa Rica has recently modified the Ramsar definition to reflect the predominance of coastal wetlands and mangrove ecosystem.

The Ramsar Convention's Strategic Plan 1997-2002, adopted by the COP in 1996, provides a clear conceptual frame work and ordered structure for the next phase of implementation. Its Mission statement for the convention-"the conservation and the wise use of wetlands by National and International co-operation as a means to achieving Sustainable Development throughout the World '-is intended to anchor Ramsar firmly with in the body of more modern environmental instruments founded on the concept of Sustainable Development. Under the Ramsar Convention on Wetlands, the two concepts of wise use and site designation are fully compatible and mutually reinforcing. The Contracting Parties are expected to designate sites for the List of Wetlands of International Importance, "on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology" (Article 2.2). The Contracting Parties to "formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory" (Article 3.1)

Ramsar COP3 (1987) defined wise use of wetlands as "their sustainable utilization for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem".⁴ The Strategic Plan (at COP6 (1996) and COP8 (2002) equate) adopted "wise use" with sustainable use. Contracting Parties to the Convention also recognize that wetlands, through their ecological and hydrological functions, provide invaluable services, products and benefits enjoyed by, and sustaining, human populations. Therefore, the Convention promotes practices that will ensure that all wetlands, and especially those designated for the Ramsar List, will continue to provide these functions and values for future generations as well as for the conservation of biological diversity.

⁴ This definition was updated in 2005 by Resolution IX.1, Annex A, to *Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development*

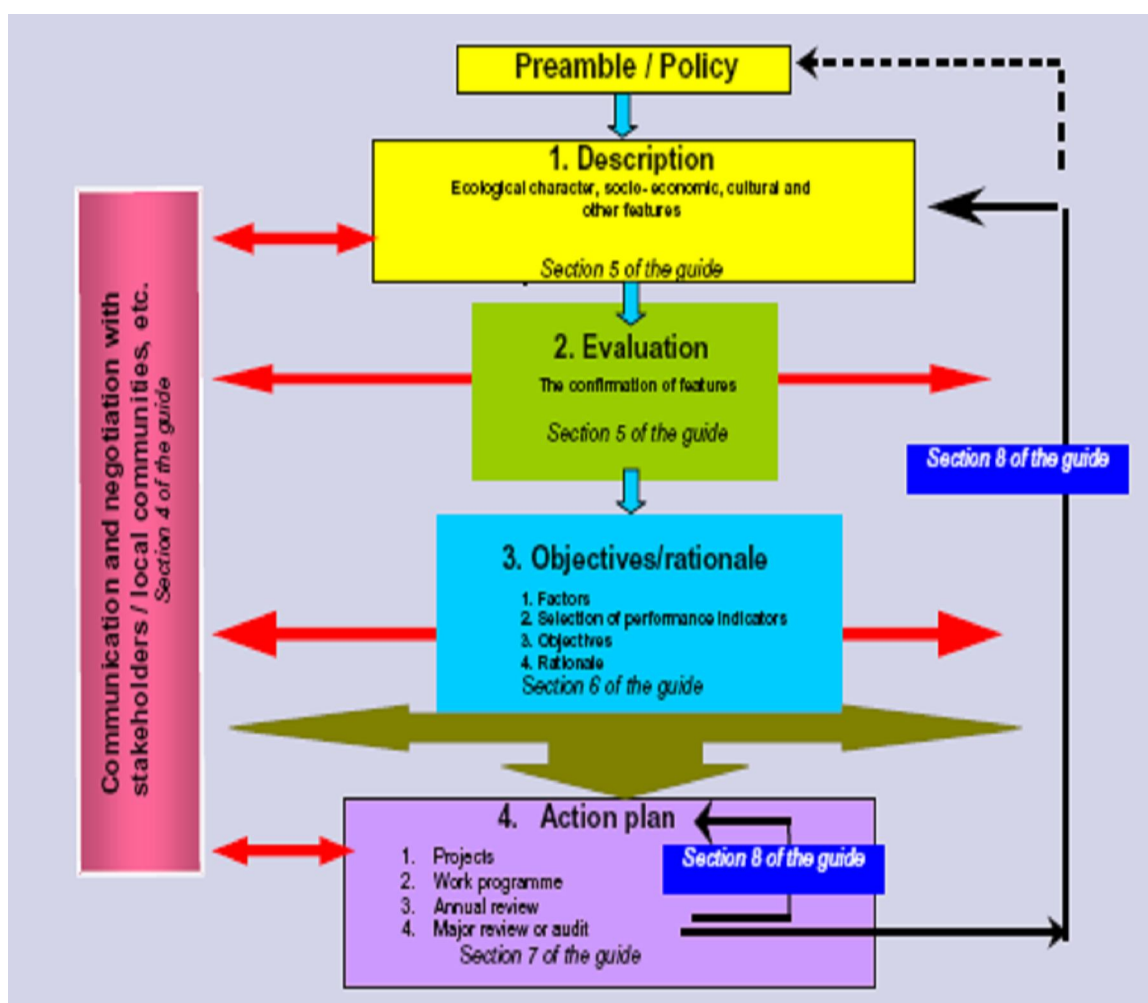
2.2 Wetland Management Planning: a guide for site managers

Designed to complement the Ramsar management planning guidelines adopted by Resolution VIII.14, this guide has been developed by WWF in association with Ramsar's Scientific & Technical Review Panel (STRP) in response to a request by Ramsar COP8 for the preparation of a simple "field guide" to wetland management planning. *Wetland management planning: a guide for site managers* provides those responsible for on-the-ground management of Ramsar sites and other wetlands with a simple *aide memoire* summary of key issues and activities to remember and apply in the various different stages of the management planning process. The guide is arranged in a series of colour-coded sections designed to facilitate easy look-up when a manager is dealing with a particular aspect of the process. The guide is organized in the following sections:

i. Introduction ii. The need for management planning, iii. Essentials of management planning iv. Successful wetland management planning, v. Knowing the wetland and its values vi. Setting management objectives, vii. Achieving management objectives and viii. Closing the planning loop.

The *New Guidelines* recognize that the establishment and implementation of a management plan for a Ramsar site or other wetland is part of an integrated management planning process, which helps to decide upon the objectives of site management; identify and describe the management actions required to achieve the objectives. It also determines the factors that affect, or may affect, the various site features including functions. It define monitoring requirements for detecting changes in ecological character and for measuring the effectiveness of management; demonstrate that management is effective and efficient; maintain continuity of effective management; resolve any conflicts of interest; obtain resources for management implementation; enable communication within and between sites, organizations and stakeholders; and ensure compliance with local, national and international policies. They include guidance on integrating site management planning into broad-scale environmental management planning, as well as the requested additional guidance on zonation, and on the precautionary approach. The Guidelines also stress the critical importance of recognizing socio-economic and cultural features

and functions of wetlands and of ensuring full stakeholder and local community involvement from the earliest stages of the management planning process.



Source: Ramsar Hand books16: Managing wetlands

An overview diagram shows how each of these sections relates to the more detailed guidance provided in Resolution VIII.14 and the Handbook 16. The guide is supplemented with several case studies of successful wetland management planning activities in different parts of the world.⁵

⁵ **New Guidelines for management planning for Ramsar sites and other wetlands**
[from the annex to Resolution VIII.14]

I. Introduction: 15. These Guidelines replace the Ramsar *Guidelines on management planning for Ramsar sites and other wetlands* adopted by Resolution 5.7 of COP5 in 1993 and published in the 1st Edition of Ramsar Handbook 8 (January 2000). They provide additional guidance on environmental, social and economic impact assessment and cost-

benefit analysis, zonation and multiple use, design and maintenance of buffer zones, and the application of the precautionary approach. 16. The guidelines are relevant to the requirements of the Convention concerning the conservation of wetlands included in the List of Wetlands of International Importance, and the wise use of all wetlands in the territory of Contracting Parties (Article 3 of the Convention), as well as the establishment of nature reserves (protected areas) at wetlands, whether or not they are included in the Ramsar List (Article 4.1). 17. These guidelines focus on the site-based scale of management planning. It is recognized, however, that designated Ramsar sites include a wide range of different applications of 'site' since they range in size from less than 1 hectare to over 6 million hectares, and that whilst some have boundaries delimiting just a discrete wetland area, others include surrounding non-wetland buffer zones, habitat mosaics, or catchments areas within their boundaries. It is therefore, recognized that the application of these guidelines will need to be flexible, depending upon the particular characteristics and circumstances of each Ramsar site or other wetland. 18. Ramsar site management plans should be integrated into the public development planning system at local, regional or national level. The integration of site management plans into spatial and economic planning at the appropriate level will ensure implementation, public participation and local ownership. Furthermore, integration will enhance the possibility of local as well as external funding. 19. The guidelines also recognize that site-based management planning should be one element of a multi-scalar approach to wise use planning and management and should be linked with broad-scale landscape and ecosystem planning, including at the integrated river basin and coastal zone scales, because policy and planning decisions at these scales will affect the conservation and wise use of wetland sites. 20. These new guidelines place further emphasis on the role of a management plan as part of an overall management planning process and provide additional advice on incorporating good practice in management planning, including adaptable management, outcomes, quantified objectives, and integrated monitoring.

II. General guidelines: 21. Wetlands are dynamic areas, open to influence from natural and human factors. In order to maintain their biological diversity and productivity (i.e., their 'ecological character' as defined by the Convention), and to permit the wise use of their resources by people, an overall agreement is essential between the various managers, owners, occupiers and other stakeholders. The management planning process provides the mechanism to achieve this agreement. 22. The management plan itself should be a technical document, though it may be appropriate for it to be supported by legislation and in some circumstances to be adopted as a legal document. 23. The management plan is part of a dynamic and continuing management planning process. The plan should be kept under review and adjusted to take into account the monitoring process, changing priorities, and emerging issues. 24. An authority should be appointed to implement the management planning process, and this authority should be clearly identified to all stakeholders. This is particularly important on a large site where there is a need to take account of all interests, users, and pressures on the wetland, in a complex ownership and management situation. 25. Although conditions vary at individual wetlands, these guidelines may be applied worldwide. The guidelines provide a conceptual background to, and framework for, wetland management planning and an outline of the main sections of a management plan. It is emphasized that the guidelines do not provide a prescription for the detailed contents of a complete management plan itself, which will be a much more detailed document and should be prepared at regional or local level. ["Ecological character is the combination of the ecosystem components, processes and benefits/services that characterize the wetland at a given point in time." (Resolution IX.1 Annex A).] 26. A management plan, and the management planning process, should only be as large or complex as the site requires. The production of a large, elaborate and expensive plan will not be possible, and certainly not justifiable, for many sites. The size of a plan, and (perhaps more importantly) the resources made available for its production, must be in proportion to the size and complexity of the site, and also to the total resources available for the safeguarding and/or management of the site. Thus for small uncomplicated sites, brief,

2.3 Cultural Values of Wetlands

Water is one of the five basic elements (Earth, Water, Air, Atmosphere and Fire) from which creation emanates. Evolution of human culture and civilization has revolved around river systems. Ancient civilizations such as Mohanjodaro and Harrapa alongside known as the Indus Valley started around 4000-5000 B.C.

Our ancient religious texts and epics give a good insight into the water storage and conservation systems prevailing in earlier times. The importance given to water in ancient India is reflected from the several hymns of the Vedas and epics and the narratives from other valuable works such as the Arthashastra of Kautilya; Kautilya envisages a variety of natural features-mountains, valleys, plains, deserts, jungles, lakes and rivers and it was protected by the forts {2.3.1}. The janapada or countryside consisted of villages with clearly marked boundaries and rivers and lakes had dams and embankments impounding water for agriculture {2.1.20-23}⁶.

Rigveda⁷, Manusmriti⁸, Charak Samhita⁹ have emphasized on the purity of water and healing and medicinal value of water. River waters are treated as holy by the people of India and are utilized in various festivals/poojas/religious ceremonies. It is believed that Ganga, the heavenly river was brought down to the earth through the efforts of King Bhagirath, who underwent great penance to wash away the sins of his ancestor. So intense are the beliefs of people of India in rain god that even today people pray in mass gatherings for rain to occur on time. The water of river Ganges is considered so sacred that people keep it in their homes for use in prayer at the time of death. Since

concise plans will suffice. For large or zoned sites, it may be appropriate to develop separate detailed plans for different sections of the site, within an overall statement of objectives for the whole site.²⁷ Often management planning should not be restricted to the defined site boundary, but rather should also take into account the wider context of planning and management, notably in the basin or coastal zone within which the site is located, which can be transboundary in nature. It is important to ensure that the site planning takes into account the external natural and human-induced factors and their influence on the site, and also to ensure that the management objectives for a site are taken into account in the wider planning processes. For further guidance see Ramsar's *Guidelines for integrating wetland conservation and wise use into river basin management* (Ramsar Handbook [7]); the *Principles and guidelines for incorporating wetland issues into integrated coastal zone management (ICZM)* (Ramsar Handbook [10]); and *Guidelines for international cooperation under the Ramsar Convention on Wetlands* (Ramsar Handbook [17]) concerning transboundary wetlands.

⁶ Kautilya- "The Arthashastra" by; R.Shamasastri and R.P.Kangle.publi;Penguin classics,Penguin Books India Ltd., 1987. P.43-44

⁷ Rigveda, VII,42.2

⁸ Manusmriti, IV,56

⁹ Charak Samhita, Sutrasthanam XXVII213,215, Charak Samhita, VimanusthanaII6(1)

Vedic times, water has been enjoying the most respectable and unique status. Melas and fairs are held in and around rivers. Since time immemorial, the Kumbh Mela, the greatest of the Fairs is observed while standing in water; it has attracted people from all walks of life. It is celebrated every 12 years on river Ganga (Prayag/Sangam). The Kumbh Mela has wielded a mesmeric influence over the mind and hearts of the Indian masses. Other water related festival includes the Pushkar Mela held every year in Kartika month in around Pushkar Lake near Ajmer in Rajasthan.¹⁰ Our cultural and natural heritage is an irreplaceable source of inspiration and is priceless and irreplaceable, not only for an individual nation, but for mankind as a whole. Parts of that heritage, because of their exceptional qualities, can be considered to be of outstanding universal value and as such, worthy of special protection against the dangers which increasingly threaten them. In an attempt to remedy this perilous situation and to ensure, as far as possible, the proper identification, protection, conservation, and preservation of the world's irreplaceable heritage, they are covered under the agenda of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) adopted in 1972 and the Convention Concerning the Protection of the World Cultural and Natural Heritage (WHC). The most significant feature of the Convention is to link together in a single document the concepts of nature conservation and the preservation of cultural sites. Nature and culture are complementary and cultural identity is strongly related to the natural environment in which it develops. Natural heritage refers to 'outstanding physical, biological, and geological formations, habitats of threatened species of animals and plants and areas with scientific, conservation, or aesthetic value'.

<p>Box 2. Indicative list of cultural features of wetlands for evaluation for wetland management planning.(derived from Cultural aspects of wetlands (Ramsar COPS DOC.15)</p>
<p>Palaeontological and archaeological records</p>
<p>Historical buildings and artifacts</p>

¹⁰Refer: C.P.Kumar "*Fresh Water Resources*": A Perspective (International Year of Fresh Water – 2003) Scientist, National Institute of Hydrology, Roorkee -Uttaranchal- India .July, 2003.p

Cultural landscapes
Traditional production and agro-ecosystems e.g. rice fields, Salinas, exploited estuaries
Collective water and land management practices
Self-management practices, including customary rights and tenures
Traditional techniques for exploiting wetland resources
Oral traditions
Traditional knowledge
Religious aspects, beliefs and mythology
‘The arts’-Music, song dance, painting, literature and cinema

Table: List of cultural features of Wetlands. Source: Ramsar Hand books16: Managing wetlands.

It is the duty of member states to identify potential sites and delineate their properties as mentioned in the Convention. To be included in the World Heritage List, sites must satisfy the selection criteria which are as follows;

Natural properties should:

- be outstanding examples representing major stages of the Earth’s history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features, or
- be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystem, and communities of plants and animals,
- contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance, or
- contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened

species of outstanding universal value from the point of view of science or conservation.¹¹

India is a party to the Convention Concerning the Protection of the World Cultural and Natural Heritage, 1973 and ratified on 14 October 1977. Systematic monitoring and reporting is the continuous process of observing the conditions of World Heritage sites with periodic reporting on its state of conservation. It is the prime responsibility of the State Party to put in place on-site monitoring arrangements as an integral component of day-to-day conservation and management of the sites. The State Parties are also obligated to have policies and legislations for the conservation and protection of cultural and natural heritage of their country.

In India, The Archaeological Survey of India and Ministry of Environment and Forests are the national agencies dealing with World Heritage activities. Currently, India is a member of the World Heritage Committee. Earlier, India was the vice-chairperson of the Committee in the years 1985, 1986, and 1988. India implements protection of World Heritage natural sites through its system of national parks. In all, five natural sites of India, viz., Kaziranga National Park and Manas Tiger Reserve, both in Assam; Keoladeo National Park, Rajasthan; Sundarbans National Park, West Bengal; and Nanda Devi National Park, Uttaranchal, are listed under the World Heritage List. Apart from this, the Valley of Flowers National Park, Uttaranchal, has also been inscribed the World Heritage status as an extension of Nanda Devi National Park. Out of these five sites, two are seriously threatened in recent years, the Manas National Park and Kaziranga National Park. Manas National Park has been listed on the List of World Heritage in Danger under the WHC in 1992. These natural sites are given protection under the Wildlife (Protection) Act, 1972, as amended in 2002.¹² Wetlands have significant religious, historical, archaeological or other cultural values for local communities, representing a part of a nation's heritage. Some wetlands support traditional activities that represent part of the history of the nation – at Mai Po marshes, for example, these human-made wetlands represent the only remaining place where Hong Kong residents can witness the operation of the Gei Wai (shrimp ponds), a traditional method of shrimp cultivation practiced by local people for hundreds of

¹¹ Hand book on '*International Environmental Agreements*'- An Indian perspectives. Chapter-VII,p.122-130 Publ.,(2006)Centre for environmental law (WWF & MoEF), NewDelhi

¹² Ibid.4. Also refer:<http://whc.unesco.org>

years. In some cultures, wetlands may have deep religious significance for local people. In Tibet, pre-Buddhist belief identified various lakes as sacred, making them objects of worship as well as ensuring their protection from pollution and other harm. As Buddhism took over, these beliefs remained, albeit in a modified form, and certain lakes in Tibet are still sacred to the people with strict regulations that determine their exploitation.¹³ Ramsar's World Wetlands Day 2002 focused on the cultural heritage in wetlands and the need for management strategies that will safeguard this heritage as well as the natural values and functions of wetlands. In India, most of the wetlands identified for conservation and management include wetlands of cultural significance in addition to their social and economic values. However, economic valuation carried out for some of these wetlands have highlighted cultural importance of the identified wetlands. Specific programmes have been developed to promote appreciation and revitalization of cultural values. Almost all wetlands in India have cultural importance as communities are intricately culturally linked with these wetlands in terms of their religious and other cultural values. Some of the wetlands such as Rudrasagar in Tripura and several wetlands in Rajasthan have tremendous archaeological importance in terms of archaeological structures constructed in the past by the rulers of these states. Moti Mahal in Rudrasagar, Jal Mahal in Pichola, and some other archaeological structures constructed within Chilika Lake are specific examples where concerned state governments are keen to conserve these sites considering their importance as cultural heritage sites. In general, guiding principles as per the resolution- viii.19, on cultural values of wetlands adopted by COP8 are very broad in nature and are incorporated directly or indirectly in the management plans formulated by the concerned state governments. Almost all priority wetlands are identified considering their socio-cultural sensitivity. All the 25 wetlands designated as wetlands of international importance under Ramsar Convention by India have strong component on cultural values. Socio-cultural values have been taken into consideration while designating these sites under the Convention.¹⁴

2.4 Ecological and economic values

Water as a resource is under relentless pressure. Due to population growth, economic development, rapid urbanization, large-scale industrialization and

¹³ 'Wetlands Values and Functions', The Ramsar Bureau, Switzerland. <http://ramsar.org>. P.1-2.

¹⁴ Ramsar Cop10 report page. 45-46 submitted by the Government of India (MoEF) for the forth coming meeting to be held at RamsarCop10, Chongwon-2008

environmental concerns water stress has emerged as a real threat. The scarcity of water for human and ecosystem uses and the deteriorating water quality leads to "water stress" and intense socio-political pressures. Many areas in the country are already under severe water stress. Any addition to the intensity of water stress in the existing water scarcity areas, or addition of new areas to water stressed list, will only further push the problem in to the realm of a disaster. Although about three-fourth of earth is water, the estimated volume of freshwater in our rivers, groundwater, snow and ice, is about 2.5% only, the rest being the sea / salt water. Most of the freshwater are either in the form of ice and permanent snow cover in Antarctic/Arctic regions (about 69%) or is stored underground in the form of deep underground basins/aquifers, soil moistures etc (30%). Total usable freshwater supply to ecosystem and humans from river system, lakes, wetlands, soil moisture and shallow groundwater is less than 1% of all freshwater and only 0.01% of all the WATER ON EARTH. As per WHO estimates, only 0.007% of all water on earth is readily available for human world consumption. This indicates that Freshwater on earth is finite and also unevenly distributed.¹⁵

Freshwater wetlands hold more than 40% of the world's species and 12% of all animal species. Some wetlands contain significant numbers of endemic species – such as Lake Tanganyika with 632 endemic animal species and the Amazon River with an estimated 1,800 endemic species of fish. Coral reefs rival tropical rainforests in terms of biodiversity; they may contain 25% of all marine species. Reefs hold an estimated 4,000 species of fish and 800 species of reef-building corals; total number of species associated with reefs may be over one million. Wetland biodiversity is a significant reservoir of genes that has considerable economic potential in the pharmaceutical industry and in commercial crop plants such as rice. Commercially bred crops, such as rice, have a "lifespan" of 10-15 years before new genetic material is required to combat pest and disease problems. Wetland animal and plant species play a role in the pharmaceutical industry – 80% of the world's population depends on traditional medicine for primary health care. Wetland species have also been extensively used in the medical industry. It is estimated that over 20,000 medicinal plant species are

¹⁵ C.P.Kumar, "Fresh water resources" - A perspectives. International year of Fresh Water-2003- a report. The National Institute of hydrology, Roorkee, Uttaranchal. p.6
<http://www.angelfire.com/bc/nihhrrc/documents/fresh.html> visited on 29-01-2009.

currently in use, some of them from wetlands, and over 80% of the world's population depend on traditional medicine for their primary health care needs.¹⁶

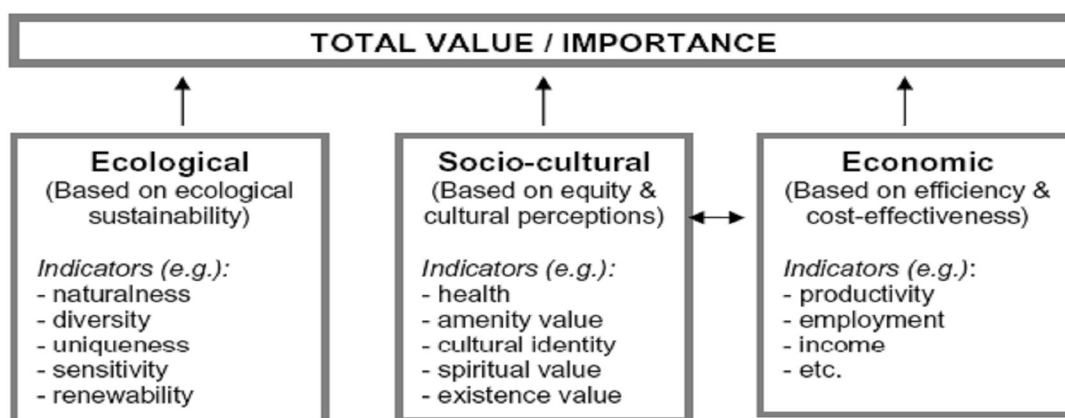
2.5 The components of the total value of a wetland

The values of wetlands can be grouped in three components based on the ecological sustainability, equity and cultural perceptions and its efficiency and cost – effectiveness. The features of the system may be grouped into components, functions and attributes. The components of the system are the biotic and non-biotic features which include the soil, water, plants and animals. The interactions between the components express themselves as functions, including nutrient cycling and exchange of water between the surface and the groundwater and the surface and the atmosphere. The system also has attributes, such as the diversity of species. Wetland systems directly support millions of people and provide goods and services to the world outside the wetland. People use wetland soils for agriculture, they catch wetland fish to eat, and they cut wetland trees for timber and fuel wood and wetland reeds to make mats and to thatch roofs. Direct use may also take the form of recreation, such as bird watching or sailing, or scientific study. For example, peat soils have preserved ancient remains of people and track ways, which are of great interest to archaeologists. Wetlands are dynamic systems, continually undergoing natural change due to subsidence, drought, sea-level rise, or infilling with sediment or organic material. Thus, many wetlands are only temporary features of the landscape and will be expected to change and eventually disappear, whilst new wetlands are created elsewhere. Direct and indirect human activity has considerably altered the rate of change of wetlands. To some degree, we have created new artificial wetlands by building reservoirs, canals and flood storage areas. However, the loss of wetlands has far outstripped the gains. The view that wetlands are wastelands, resulting from ignorance or misunderstanding of the value of the goods and services available, has led to their conversion to intensive agricultural, industrial or residential uses. Individual desires of farmers or developers have been supported by government policy and subsidies. In addition to direct action on the land, river engineering schemes have diverted water away from wetlands, as it has been believed that this

¹⁶ Reservoirs of bio-diversity, Wetlands, values & functions, The Ramsar Bureau, Switzerland.
www. <http://ramsar.org>. P.1-2

water is wasted in the wetland or at least has a lower value than its use for rice irrigation upstream. Some organizations still look upon wetlands only in terms of their potential to provide farmland to feed an ever-expanding population, which normally requires alteration of the natural system. Wetlands may also be lost by pollution, waste disposal, mining or groundwater abstraction.¹⁷ In India, the concept of economic evaluation for wetlands has been undertaken in Harike (Punjab) for Small Grants Funds and now for Chilika (Orissa). The economic evaluation encompasses values of various functions and activities of the wetlands, which can help in developing a framework for efficient allocation of resources for the sustainable development of wetlands. This could be an effective tool for integrating wetland management with overall development, planning and resource management.¹⁸

The components of the Total Value of a wetland



Source: Ramsar Technical Report No.3 CBD Technical Series No.27

2.6 Scientific approaches

The potential benefits of wetlands have been assessed by the scientific methods. The value of each wetland can be grouped under global values; it includes the contribution of wetlands to the mosaic of ecosystem, which maintains global diversity, and the

¹⁷ Barbier, E.B., Acreman, M.C. and Knowler, D. 1996. 'Economic valuation of wetlands: a guide for policy makers and planners'; The Ramsar Library, Ramsar Convention Bureau, Gland, Switzerland. <http://ramsar.org>. P.9

¹⁸ National Report on the implementation of the Ramsar convention on wetlands, Submitted by the MoEF, Govt., of India, (COP10 to be held at Republic of Korea, 28th Oct-4th Nov, 2008), Page.28. www.ramsar.org visited on 02-08-2008

special value of some wetlands as ecotones between dry land and open water. The major functional values include nutrient retention and export, ground water recharge, erosion and salinity control etc., the habitat values of wetlands provide a conducive environment for a wide variety of flora and fauna. The Ministry of Environment and Forests (MoEF) carried out a survey to assess the wetland resources in India in the early 1980s. Based on this a directory of wetlands was published by the MoEF in 1990 which gives information on location, geographical coordinates, and the extent and ecological categories of wetlands over 100 hectares in different states and union territories. A nation wide project on wetlands was undertaken by the MoEF in 1993 to carry out survey and mapping of wetlands in the country using remote sensing technology.¹⁹ Subsequently, WWF-India in collaboration with Wetlands International (formerly called as Asian wetlands Bureau) has revised the section dealing with India's wetlands in the Asian Directory. The most recent effort, to map and inventories wetlands in India through Geographic Information System (GIS) and remote sensing (RS), by the Space Application Centre (SAC), Ahmedabad, was completed in 1998, and a detailed database was published (Garg & etal.1998).

The surveys carried out for inventory of wetlands give some information and ecological characteristics, yet little information is available on the patterns of resource utilization, socio-economic aspects and traditional uses. It would be crucial to carry out assessment of wetland resources in the country with emphasis on the present wetland area and changes that have taken place over a period of time with regard to their area, vegetation cover, faunal distribution, siltation, encroachment, zonation and overall drainage pattern.²⁰ The wise use of wetlands, as stated by the Ramsar Convention, essentially involves conservation of ecosystems while ensuring benefits to the local communities, particularly to the weaker section of the society on a long-term basis. It involves providing maximum benefits to the people of the present generation dependent on these resources while keeping its potential for meeting the needs of the future generations. The concept of wise use is closely related to the

¹⁹ Jyoti Parikh, Hemant Dayte, "*Sustainable Management of Wetlands: biodiversity and beyond*," Sage publication Pvt.,Ltd., New Delhi. p.55-56

²⁰ Ibid. 7, p.56

concept of sustainable development.²¹ Wise use emphasizes integration of social, economic and ecological dimensions in the resource management. Wise use can be applied either at specific wetland sites or at the regional level taking into consideration all the wetland types and its resources. The essential features of wise use include; assessment of wetland resources, developing national wetland policy or strategy supported by legislative measures for regulation, inventory, capacity building, and conservation of wetland sites, and research.²²

The National Water Development Agency set up by the Union Government under the Ministry of Water Resources has prepared in 1980 prepared a National Perspective Plan for development of country's water resources, disregarding political boundaries of States. The National Perspective Plan envisages the construction of about,180 b.cu.m of storages, which, along with the inter-links, will facilitate additional utilization of nearly 240 b.cu.m of water for beneficial use. This will enable irrigation over an additional area of 35 million hectare, comprising 25 million hectare by surface water and 10 million hectare by increased use of ground water, besides 34,000 MW of substantial hydropower generation, flood control and other multifarious benefits would accrue. Government of India constituted a Ground Water Estimation Committee (GWES) in 1982 to recommend methodologies for estimation of the ground water resource potential in India. It was recommended by the committee that the ground water recharge should be estimated based on ground water level fluctuation method. However, in areas, where ground water level monitoring is not being done regularly, or where adequate data about ground water level fluctuation is not available, adhoc norms of rainfall infiltration may be adopted. As the crisis approaches and as water resources become scarcer, the risk of conflict over them will become greater. After 2025 AD climate, change could also make conditions worse if precipitation amounts decrease in the major food producing regions and evaporation rates increase. The bulk of the increase in food production has to come from irrigated lands and this, in turn, will require more money to be spent on long distance water transfers, dams and the like, should the resources be available. The increasing size and number of cities will create a much bigger pollution load unless sanitation systems are

²¹ It was defined at the Regina Conference held in 1987, which states that 'the Wise use of wetlands is their sustainable utilization for the benefit of man kind in away compatible with the maintenance of the properties of the ecosystem'.

²² Ibid 8 p.55.

provided. Urgent and decisive action must begin now if impending water crisis of a national proportions later in the 21st Century – are to be avoided during the next 30 years.²³

The decreasing freshwater availability is causing concern not only in India but also all over the world. Protection and Quality of Freshwater Resources has been identified as one of the main action for sustainable development in the World Summit on Sustainable Development in Rio, Brazil in 1992. Realizing this Ministerial declaration at the Second World Water Forum in The Hague in March 2000 called upon the nations to work toward water security in the 21st century and make water as everybody's business. Further, the Ministerial Declaration at Freshwater meet in Bonn, 2001 placed greater commitment on agreed principles of water resources management and called upon for new partnership to create water wisdom, cleaning up watersheds, to reaching communities and innovative solutions for sustainable use, protection and management of freshwater resources. In 1995, UNICEF and the World Wide Fund for Nature (WWF) commissioned case studies in five different ecological regions of the country with the objective of providing insights in the trends in water availability and use at the local level for all purposes to study the water balance situation. The studies gathered primary data and information through participatory rural appraisals, surveys, testing of water and soil quality and hydro-geological observations over a full one-year cycle covering all the seasons. The studies examined the fresh water situation using an eco-system approach and documented the actions of people to meet their basic water needs, but also their actions to increase family income, using available water resources. They bring out the diversity of the situation, which provides both opportunities and challenges for action. The synthesis report of these case studies "Fresh Water for India's Children and Nature" provides policy and programmatic recommendations for fresh water management.²⁴

In order to see how a country is progressing over time, it is necessary to examine the position as time passes. In order to do this, a monitoring system needs to be developed based on simple indicators. The most familiar of these is the Consumer Price Index

²³ C.P.Kumar "*Fresh water resources: A perspectives.*" International year of Fresh Water-2003, a report: The National Institute of hydrology, Roorkee, Uttaranchal. p.6
<http://www.angelfire.com/bc/nihhrrc/documents/fresh.html> visited on 29-01-2009

²⁴ Ibid.p.25

(CPI), which is an example of an easy-to-use indicator that helps us to see what is happening to consumer prices. All economic systems use this CPI tool for measuring inflation, and it has wide policy use, which is frequently quoted in the popular press. In a similar way, we can use a simple and easy-to-use indicator, which people can apply to their own situations, to get a better understanding of how water can best be managed to meet their own needs. A possible approach to this is the Water Poverty Index (WPI), which is designed to provide a standardized framework for such an indicator, and for each country, appropriate and available data for each component can be identified.²⁵

The National Water Policy-2002, (NWP-2002) emphasis on the effective and economical management of our water resources, the frontiers of knowledge need to be pushed forward in several directions by intensifying research efforts in various areas, including the following areas, such as, hydrometeorology; snow and lake hydrology, surface and ground water hydrology. It covers the river morphology and hydraulics, assessment of water resources, water harvesting and ground water recharge, water quality, water conservation, evaporation and seepage losses, recycling and re-use, better water management practices and improvements in operational technology.

The NWP-2002, also focuses on crops and cropping systems, soils and material research, new construction materials and technology (with particular reference to roller compacted concrete, fiber reinforced concrete, new methodologies in tunneling technologies, instrumentation, advanced numerical analysis in structures and back analysis); seismology and seismic design of structures. Further, the safety and longevity of water-related structures, economical designs for water resource projects, risk analysis and disaster management, use of remote sensing techniques in development and management are covered. The use of static ground water resource as a crisis management measure; sedimentation of reservoirs, use of sea water resources, prevention of salinity ingress, prevention of water logging and soil salinity, reclamation of water logged and saline lands, environmental impact, regional equity.²⁶

²⁵ Ibid p.39

²⁶ Refer; National Water policy-2002 (Policy Item No.25-Science and Technology),Published by: The Ministry of Water resources, Government of India,. New Delhi, April-2002.
<http://wrmin.nic.in/writereaddata/linkimages/nwp20025617515534.pdf> visited on;30-01-2009.

2.7 Valuing Wetlands

Valuation of wetlands forms one of the many types of wetland assessment, which can and should be used for different purposes and at different scales in support of wetland wise use, management and decision-making. In order to make better decisions regarding the use and management of wetland ecosystem services, their importance to human society must be assessed. The importance or “value” of ecosystems is viewed and expressed differently by different disciplines, cultural conceptions, philosophical views, and schools of thought. ‘Valuation’ is defined by the *Millennium Ecosystem Assessment* (2003) as “the process of expressing a value for a particular good or service...in terms of something that can be counted, often money, but also through methods and measures from other disciplines (sociology, ecology and so on)”. wetland valuation important because of the many services and multiple values of wetlands, many different stakeholders are involved in wetland use, often leading to conflicting interests and the over-exploitation of some services (e.g., fisheries or waste disposal) at the expense of others (e.g., biodiversity conservation and flood control).²⁷

Wetland valuation can be used for obtaining more and better information on the socio-cultural and economic benefits of ecosystem services, which are required to;

- ❖ demonstrate the contribution of wetlands to the local, national and global economy (and thus build local and political support for their conservation and sustainable use);
- ❖ convince decision-makers that the benefits of conservation and sustainable use of wetlands usually outweigh the costs and explain to them the need to better factor wetlands into development planning (through more balanced cost-benefit analysis);
- ❖ identify the users and beneficiaries of wetland services to attract investments and secure sustainable financial streams and incentives for the maintenance,

²⁷ The relationships between them have been summarized in the Convention’s *Integrated Framework for Wetland Inventory, Assessment and Monitoring*, which is available as Resolution IX.1 Annex E (http://www.ramsar.org/res/key_res_ix_index_e.htm).

or restoration, of these services (i.e., make users pay and ensure that local people receive a proper share of the benefits); and

- ❖ increase awareness about the many benefits of wetlands to human well-being and ensure that wetlands are better taken into account in economic welfare indicators (e.g., in Gross National Product (GNP) calculations) and pricing mechanisms (through internalization of externalities).

In addition to raising awareness about wetland benefits in decision-making, valuation studies can help to improve how local institutions manage resources; identify better markets and resource management options for wetlands and their products; and investigate people's livelihood strategies and how these determine the constraints and options for making wise use of wetlands (Guijt and Hinchcliffe 1998).

Wetland valuation can also help in sizing the amount of damage done by an accident, natural disaster or illegal use, thereby helping in legal proceedings and decisions on suitable restoration options.²⁸ Further, it can help identify the economic contribution which wetlands make at present or can potentially make in the future, and estimate the benefits. The valuation exercise makes us aware as to which attributes of wetlands are valuable and facilitate the wetlands management strategy. A valuation exercise is educational, leads to enhanced understanding, capacity building, and enables awareness. Informed awareness can prevent outsiders from destroying it, consciously or unconsciously.

²⁸ *Ramsar Technical Report No. 3 CBD Technical Series No. 27* p.5 & 7 Valuing wetlands Guidance for valuing the benefits derived from wetland ecosystem services, De Grouts, Stuij, Finlayson, and Davidson



Picture of a coastal wetland:²⁹

Coastal sites, such as the Gandoca-Manzanillo Ramsar Site in Costa Rica shown here, provide valuable protection against storms, one of the many wetland functions that can be used for the evaluation of socio-economic features of wetlands for management planning.

²⁹ Source: Ramsar Hand Book 16, *Managing Wetlands*.p.35



Picture shows the cultural heritage of wetlands

Source & Courtesy: This painting was produced in Costa Rica during the 7th meeting of the Conference of the Contracting Parties (COP) to the Ramsar Convention, May 1999. The seven indigenous artists, from the Solentiname archipelago in the south-east corner of Lake Cocibolca, Nicaragua, live in fishing and farming communities that are closely linked to their wetland environment. Their presence at the Conference was part of a much larger project organized by IUCN-Mesoamerica that brought together local groups in several countries to discuss the importance of wetlands in their lives; an outcome of the meeting was a “People’s declaration on wetlands”, which was subsequently presented at the Conference.³⁰ As a part of the project, a workshop for artists in Solentiname encouraged an artistic expression of the close relationship between the people and their wetlands, and a group of these artists, working during the COP in Costa Rica, produced this painting of their Solentiname environment. The painting is currently displayed in the office of the Secretary General of the Ramsar Convention in Switzerland. (Artists: *Fernando Altamirano, Paula Clarisa Arellano, Rodolfo Arellano, Silvia Arellano, Gloria Guevara, Elba Jimenez, Rosa Pineda.*)

³⁰ [http://ramsar.org/ cop7_declaration.htm](http://ramsar.org/cop7_declaration.htm).

Table.1 (A.) Indicative list of wetland values and functions for the evaluation of Socio-economic features of wetlands for management planning

(Derived from Annex III of CBD's Guidelines for incorporating biodiversity related issues into environmental impact assessment legislation and/or processes in strategic in environmental assessment, see Resolution VIII.9, (and Handbook 13 in present series)

Production functions	Processing and regulation functions
Timber production	Decomposition of organic material (land based)
Firewood production	Natural desalinization of soils
Production of harvestable grasses (construction & artisanal use)	Development / prevention of acid sulphate soils
Naturally produced fodder & manure	Biological control mechanisms
Harvestable peat	Seasonal cleansing of soils
Secondary (minor) products	Soil water storage capacity
Harvestable bush meat (food)	Coastal protection against floods
Fish & shellfish productivity	Coastal stabilization (against accretion / erosion)
Drinking water supply	Soil protection
Supply of water for irrigation and industry	Water filtering
Water supply for hydroelectricity	Dilution of pollutants
Supply of surface water for other landscapes	Discharge of pollutants
Supply of ground water for other landscapes	Bio-chemical/physical purification of water
Crop productivity	Storage for pollutants
Tree plantations productivity	Flow regulation for flood control
Managed forest productivity	River base flow regulation
Rangeland /livestock productivity	Water storage capacity
Aquaculture productivity (freshwater)	Ground water recharge capacity
Mariculture productivity (brackish/saltwater)	Regulation of water balance
Carrying functions - suitability for: constructions	Sedimentation / retention capacity
	Protection against water erosion
	Protection against wave action

indigenous settlement	Prevention of saline groundwater intrusion Prevention of saline surface-water intrusion Transmission of diseases Carbon sequestration Maintenance of pollinator services
rural settlement	
urban settlement	
industry	
infrastructure	
transport infrastructure	
shipping / navigation	
road transport	
rail transport	
air transport	
power distribution	
use of pipelines	
leisure and tourism activities	

Table: 1. Wetlands values and functions for the evaluation of socio-economic features of wetlands management and planning

Source: *Ramsar Hand books16: Managing wetlands.*

Table -2 B. Ecosystem services provided by or derived from wetlands (taken from the Millennium Ecosystem Assessment's Synthesis report on wetlands: <i>Ecosystems and human well-being: wetlands and water synthesis: a report of the Millennium Ecosystem Assessment</i>)	
PROVISIONING	
Food	production of fish, wild game, fruits, and grains
Fresh water ^a	storage and retention of water for domestic, industrial, and agricultural use
Fiber and fuel	production of logs, fuel wood, peat, fodder
Biochemical	extraction of medicines and other materials from biota
Genetic materials	genes for resistance to plant pathogens, ornamental species, and so on
REGULATING	

Climate regulation	source of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climatic processes
Water regulation (hydrological flows)	groundwater recharge/discharge
Water purification and waste treatment retention	recovery, and removal of excess nutrients and other pollutants
Erosion regulation	retention of soils and sediments
Natural hazard regulation	flood control, storm protection
Pollination	habitat for pollinators
CULTURAL	
Spiritual and inspirational	source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
Recreational	opportunities for recreational activities
Aesthetic	many people find beauty or aesthetic value in aspects of wetland ecosystems
Educational	opportunities for formal and informal education and training
SUPPORTING	
Soil formation	sediment retention and accumulation of organic matter
Nutrient cycling	storage, recycling, processing, and acquisition of nutrients
^a While fresh water was treated as a provisioning service within the MA, it is also regarded as a regulating service by various sectors.	

Table: 2. Ecosystem services provided by or derived from Wetlands

Source: *Ramsar Hand books 16: Managing wetlands*.

Wetlands have traditionally been regarded by societies as having very little, or even negative, value, often being described as wastelands or sources of disease. As a result, wetlands have been actively drained and converted to other uses, while the essentially 'open' nature of wetland systems has made them susceptible to indirect damage from other human activities. This has led to the stock of wetlands, particularly in Europe,

being substantially diminished. Environmental pressure builds up via socio-economic driving forces -demographic, economic, institutional and technological, which cause changes in environmental systems 'states'. These changes include increased nutrient fluxes, wetland habitat loss due to conversion, fragmentation and quality degradation; pollution of soil and water; and climate alteration. The processing and functioning capabilities of wetlands will be affected and this results in impacts on human welfare via productivity, health, amenity and other value changes. The impacts impose social welfare gains and losses across a spectrum of different stakeholders, depending on the spatial, socioeconomic, political and cultural setting. Policy response mechanisms will then be triggered within this continuous feedback process. It is now apparent that wetlands, far from being valueless, perform a wide array of functions that can be of considerable value of society. The physical assessment of the functions performed by a wetland is an essential prerequisite to any evaluation of a wetland's worth to society, but simply identifying these functions is insufficient. Where a wetland is under pressure from human activity that provides measurable economic benefits to society, it will be necessary to illustrate the economic value of the functions performed by the wetland. The provision of such economic information is essential if an efficient level of wetland resource conservation, restoration or recreation is to be determined. Maintaining a wetland will almost always involve costs. There will be costs associated with forgoing other uses of the land or with limiting activities that might impinge upon the ability of the wetland to continue functioning. Hence, the importance of making explicit the value of the multiple functions those wetlands perform to society, and of assessing this value within a framework, which allows comparison with the gains to be made from activities that might threaten wetlands. This should serve not only to better protect these threatened ecosystems but also to improve decision making for the benefit of society.³¹

Ecosystem *functions* are the result of interactions among characteristics, structure and processes. They include such actions as floodwater control, nutrient retention and food web support. The concept of ecosystem functions and ecosystem functioning is essential in linking ecology and economy (that is, the step between *wetland functioning* and *wetland values*). Wetland ecosystem functions provide goods and

³¹ R.Kerry Turner, Jeroen C.J.M.Van Bergh,Roy Brouwer: “*Managing Wetlands-An Ecological Approach*”, Edward Elgar Publishing, UK.p.6-7

services to society that is deemed valuable. These goods and services are the benefits derived from wetlands and they can be valued through various qualitative and quantitative valuation methods and techniques. Barbier (1994) noted that if the nutrient retention function is integral to the maintenance of biodiversity, then if both functions are valued separately and aggregated, this would double count the nutrient retention which is already 'captured' in the biodiversity value. Some functions might also be incompatible, such as water extraction and groundwater recharge, so that combining these values would overestimate the feasible benefits to be derived from the wetland.

The multifunctional characteristic of wetland ecosystems makes comprehensive estimation and valuation of every function and linkages between them a formidable task. Hence, there is need for a useful typology of the associated social, economic and cultural values. Economic values will always be contingent upon the wetland performing functions that are somehow perceived as valuable by society. Functions in themselves are therefore not necessarily of economic value. Such value derives from the existence of a demand by society for wetland *goods* and *services*. In general, the economic value of an increased (or a preserved) amount of a good or service is defined as what individuals are willing to forego of some other resources in order to obtain the increase (or maintain the status quo). Economic values are thus relative in the sense that they are expressed in terms of something else that is given up (the opportunity cost), and they are associated with the type of incremental changes to the status quo that public policy decisions are often about in practice. A value category of wetlands, usually associated with use value, is that of option value, in which an individual derives benefit from ensuring that a resource will be available for use in the future. Another type of value often mentioned in the valuation literature is quasi-option value, which is associated with the potential benefits of awaiting improved information before giving up the option to preserve a resource for future use. Quasi-option value cannot be added into the Total Economic Value (TEV) calculation without some double counting; it is best regarded as another dimension of ecosystem value. *Non-use* value is associated with benefits derived simply from the knowledge that a resource, such as an individual species or an entire wetland, is maintained. Non-use value is thus independent of use, although it is dependent upon the essential

structure of the wetland and functions it performs, such as biodiversity maintenance.

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2.8 Wetlands Policy Analysis

Policies, institutions and governance aspects influence the kind of values that will be taken into account in decision-making and management measures. The aim of policy analysis is to:

- identify the types of information (and kinds of values) required and by whom;
- understand the policy process and stakeholder interests, both in current practice and the desirable state, and how they influence the kind of information that is required;
- enable key stakeholders to assign their own values and incorporate them into decision-making, and be able to compare different kinds of values;
- describe the objective of the valuation within the policy and stakeholder context;
- identify the main valuation questions in relation to the current and 'desired' policies; and
- ensure that valuation reflects policy goals and aspirations for wetlands and those who use them.

The following five main elements should be included in policy analysis, namely;

(i) *Social capital and actors*: to involve the appropriate stakeholder groups in the valuation processes, the main actors and 'social capital' needs to be identified.

(ii) *Policy context, statements and measure*: the current policy context needs to be analyzed to see how policies interrelate, how they work together or against each other, in order to be aware of opportunities and constraints.

(iii) *Policy process and priorities*: through analyzing existing policies and policy gaps, policy priorities can be identified.

³² Ibid.p.13-14.

(iv) *Institutions and organizations*: institutions (rules, procedures, and norms of society) and organizations (government, private sector, and civil society) form the interface between policy and people.

(v) *Livelihood strategies*: An analysis of policies for sustainable livelihoods (and ecosystems) requires an understanding of the livelihood priorities, the policy sectors that are relevant, and whether or not appropriate policies exist in those sectors.³³

2.9 Criteria for Identifying Wetlands of International Importance:

Adopted by the 7th (1999) and 9th (2005) Meetings of the Conference of the Contracting Parties, to guide implementation of Article 2.1 on designation of Ramsar sites.³⁴

Group A of the criteria

Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeography region.

Group B of the criteria

Sites of international importance for conserving biodiversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeography region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

³³ Ibid. p.5-6.

³⁴ Source: Ramsar Hand Book 14: Designating Ramsar Sites.

Specific criteria based on water birds	<p>Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more water birds.</p> <p>Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.</p>
Specific criteria based on fish	<p>Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.</p> <p>Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.</p>
Specific criteria based on other taxa	<p>Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.</p>

Wetlands are composed of a number of physical, biological and chemical components such as soils, water, plant and animal species, and nutrients. Interactions among and within these components allow the wetland to perform certain *functions*. Ecosystem functions have been defined as “the capacity of ecosystem process and components to provide goods and services that satisfy human needs, directly or indirectly”. For many people, natural systems, including wetlands, are a crucial source of non-material well-being through their influence on physical and mental health and historical, national, ethical, religious, and spiritual values. A particular mountain, forest, or watershed may, for example, have been the site of an important event in their past, the home or shrine of a deity, the place of a moment of moral transformation, or the embodiment of national ideals. These are some of the values that, the Millennium Assessment

recognizes as the cultural services of ecosystems (Millennium Ecosystem Assessment 2003)³⁵.

The main types of socio-cultural values described in the literature are having therapeutic value, amenity value, heritage value, spiritual value, and existence value. Some authors consider cultural values and their social welfare indicators as a subset of economic values – others state that in practice economic valuation is limited to efficiency and cost-effectiveness analysis. These are usually measured in monetary units, disregarding the importance of its spiritual values and cultural identity, which are in many cases closely related to ecosystem services. The economic and monetary valuation are therefore treated separately from socio-cultural valuation, whereby it is emphasized that ecological, socio-cultural, and economic values all have their separate role in decision-making and should be seen as essentially complementary pieces of information in the decision-making process.³⁶

The value of the wetlands and their associated ecosystem services has been estimated at US\$14 trillion annually. Yet many of the services, such as the recharge of groundwater, water purification or aesthetic and cultural values are not immediately obvious when one looks at a wetland. Planners and decision-makers at many levels are frequently not fully aware of the connections between wetland condition and the provision of wetland services and the consequent benefits for people, benefits which often have substantial economic value. Only in very few cases have decisions been informed by the total economic value and benefits of both marketed and non-marketed services provided by wetlands. This lack of understanding and recognition leads to ill-informed decisions on management and development, which contribute to the continued rapid loss, conversion and degradation of wetlands. Despite of this, the total economic value of unconverted wetlands often being greater than that of converted wetlands.

The Ramsar Convention has long recognized the importance of wetland economic valuation in contributing to well-informed planning and decision-making, and in 1996 Ramsar's 6th meeting of the Conference of the Contracting Parties (COP6) included in the Convention's first Strategic Plan a specific Operational Objective (2.4) on

³⁵ The Millennium Ecosystem Assessment (2003) defined ecosystem services as “the benefits people obtain from ecosystems” (whereby services are defined broadly and include both goods (i.e., resources) and services in the more narrow sense (i.e., benefits from ecosystem processes and non-material uses).

³⁶ See. *Ramsar Technical Report No. 3* (at page 14 &22) supra note.17.

promoting the economic valuation of wetland benefits and functions through dissemination of valuation methods.³⁷ In India, (Ramsar Cop10 report submitted by the Government of India (MoEF) for the COP meeting held at RamsarCop10, Chongwon-2008) highlighted the importance and action taken by the Government. Social and cultural factors are important components of the management action plans developed for priority wetlands, mangroves and coral reefs. Management action plan for Loktak and Chilika Lakes particularly have been developed through elaborate social processes. The overall objective is to restore ecological integrity of wetlands while providing sustains social and economic benefits. The successful models developed are being used in other identified priority wetlands. Conservation and wise use of wetlands essentially involves management of water regimes at river basin level, conservation of biodiversity, and resource development for the sustainable livelihoods and benefits to the stakeholders. Coordinated actions at river basin level involving local communities and stakeholders in planning, implementation and decision-making ensures sustained benefits from these ecosystems on a long-term basis. Almost all the restoration projects for the identified wetlands have a component on livelihood improvement. In case of Loktak and Chilika Lake, consistent efforts have been made to link conservation programmes with the livelihood improvement of the communities with the ultimate objective of poverty reduction in these areas.³⁸

2.10 Conclusion

The overall information reveals the method of conservation of wetlands in a holistic way and the valuation techniques will help to formulate the wetlands management strategy and evolving an effective legal mechanism in controlling the degradation of ecosystems, particularly the water bodies. This is considered to be one of the

³⁷ Ibid. page-iv, Ramsar STRP, Group-I

³⁸ National Report on the implementation of the Ramsar convention on wetlands, Submitted by the MoEF, Government of India COP10 to be held at Republic of Korea, 28th Oct-4th Nov, 2008), Page.44.. www.ramsar.org visited on 02-08-2008

sustainable development mechanisms for the wetlands conservation and its wise use. The cultural, socio-economical and scientific study on wetlands conservation reveals the necessity of its conservation on the lines of wise use concept. The legal measures suggested by the Ramsar convention and its criteria pave the way for developing a unique methods in the wetlands restoration efforts. The attempts made by the governmental agencies in implementing the Ramsar initiatives is comparatively less, but not discouraging. The initiatives of the Ramsar Convention must be taken in to consideration for all the future development plans and in formulating policies. Hence, our law making and enforcing agencies must be oriented and strengthen on these lines in the implementation of effective legal mechanisms in the process of protection and conservation of wetlands of India. More emphasis needs to be given on preventive measures than the curative ones. A comprehensive approach needs to be adopted for wetland conservation on sound ecological basis. The experience gained over till date for wetland conservation would help to draw an appropriate strategy for refining the objectives and addressing issues relating to ecological and social aspects. This would help in rehabilitation of selected water bodies and sustainable utilization of their resources improving water quality enhancing biodiversity and restoring the values of wetlands.

In principle, all human activities produce culture. Wetland sites are repositories of cultural aspects, both tangible and intangible, that have been left by past civilizations and their activities, many of which have been discontinued. Moreover, contemporary activities related to wetlands are creating contemporary cultural values. Wetlands have provided valuable resources and sanctuaries for human populations and many other life forms since the very beginning of life on Earth. Major civilizations have been established in association with them and in dependence on their resources, especially the resource of water.³⁹ The cultural aspects of wetlands have the potential to become a strong element of interest and attraction for a considerable percentage of visitors, bringing benefits to local population and demonstrating the importance of wetlands; but this will not occur automatically. Educational and interpretative activities in wetlands (ecotourism and cultural routes, eco-museums, etc.) should be

³⁹ Refer; Culture and Wetlands – A Ramsar guidance document, Gland, September 2008, page 18-19

promoted in an organized and consistent manner, taking into account the sensitivities and carrying capacity of each site.

Yet, in spite of all conservation and 'wise use' efforts, wetland destruction has continued in many parts of the world, in developed and developing countries alike. At the same time, the appreciation of wetland values has led to significant projects for the restoration of lost or heavily degraded wetlands, usually at much greater cost than their initial conservation would have entailed. The experience from these projects has shown how very difficult it is to restore to any degree the values and ecological functions of destroyed or degraded wetlands. It has also demonstrated that it is practically impossible to restore, once lost, their previous cultural and historical values. These values are often associated with inanimate objects, such as buildings and other structures, as well as sacred species of fauna²⁶. However, a large part of them is borne by local societies, woven into their social fabric, constituting an integral part of their identity, and hence they are lost in a few generations after wetlands are destroyed. It should be stressed therefore that the loss of wetlands does not only remove important resources, but also causes profound social damage to human communities.⁴⁰

Wetlands and culture coexist. Wetland-related cultures and their diversity can support sustainable livelihoods and the well-being of human societies. Experience in many countries (e.g. in the Mekong River Basin) indicates that lack of awareness, weaknesses and gaps in identifying, valuing and preserving the cultural values of wetlands, as well as insufficient attention to the wetland ecosystems themselves, has caused loss or diminishment of various traditional cultures during the past century. Loss of wetland-related culture is a threatening sign of wetland loss, and loss of wetlands often results in unsustainable livelihoods.

Based on efforts to combine cultural values with natural environment values in wetlands, an integrated tourism interpretation approach can be promoted. Financial benefits and employment that could be generated through this could be a great asset for local communities, and could enhance their appreciation of the value of wetland resources. This in turn will enhance the economic valuation of wetlands, contributing

⁴⁰ Ibid page.20

to their conservation and wise use. Such an approach can be valid in many wetlands with significant cultural values, where visitors can be attracted by virtue of both their cultural and natural heritage. A particular case is the sites that already have a strong visitor interest in their monuments, but little yet for their natural values. In all cases, care must be taken that such activities do not add new pressures in sensitive wetlands.⁴¹ Wetland-related cultural landscapes are the result of traditional production and agro-ecosystems (rice fields, Salinas, exploited estuaries etc.). In many cases both the landscapes and the systems are under threat due to technological innovations and changes in socioeconomic conditions. There is a need to take a proactive approach to the conservation of these systems and areas and if required, their revitalization.

⁴¹ Papayannis, T. and Pritchard, D.E. (2008), '*Culture and wetlands*' – a Ramsar guidance document', Ramsar Convention, Gland, Switzerland, Page.24