

ENVIRONMENTAL VALUATION AND GREEN ACCOUNTING FOR THE FUTUREK. K. Joshi¹ & K Vinod²¹ Central Marine Fisheries Research Institute, Cochin, Kerala.² Calicut Research Centre of ICAR-CMFRI, Calicut, Kerala.**Abstract**

Environmental valuation is the process of expressing a value for a particular good or service in a context of decision making usually in terms of money or numbers. It's also considered to be a measure or indices of social, biological, ecological and demographic status of the system. Marine and coastal ecosystems provide a wide range of services include the provisioning services, regulating services, cultural services and supporting services. Food provisioning in the form of fisheries catch, aquaculture, ornamentals and bio prospecting is the most vital services from this system. The Total Economic Value of (TEV) consists of use values and non-use values. The use value includes direct use value, indirect use value, and option value, whereas the non-use value is the existence and bequest value. Three approaches are used in the valuation techniques: Stated preference (contingent valuation and choice modelling); Revealed preference (market price, cost-based, production, travel cost); Benefit transfer. The overexploitation of resources, degradation of the ecosystem will directly affect the food security and employment of the coastal population and have an indirect effect on the regional and national economy. To address these issues, environmental valuation is considered to be one of the effective tools for the Scientists and Managers. The green accounting refers to efforts to modify the national income accounts from which GDP and GNP are calculated, to incorporate use and depletion of natural resources. Stocktaking and dimension are the backbone of green and social accounting. The Global Reporting Initiatives (GRI) and International Organization for Standardization (ISO 14000) are the two frameworks developed for social and green accounting. The green accounting has applications in large scale and small scale business organizations. Development and implementation of green accounting will be a challenging issue for the companies coming in the years ahead. It is an interdisciplinary framework includes several magnitudes and divisions of environmental accounting. It needs a sound environmental policy, environmental accounts and their recording and training of the future practitioners to provide technical and legal basis of green auditing. The Kyoto protocol of the Convention on Biological Diversity (CBD) is a legal binding agreement with the developing countries and developed nations designed to reduce six greenhouse gases that are believed to contribute to global warming. The Kyoto Protocol is an environmental accounting in action on an international scale.

Key words: Environmental valuation, Green auditing, Ecosystem services, ISO 14000, Total Economic Value

Introduction

Coastal ecosystems are the most dynamic regions in nature, but they are extremely vulnerable systems also. They provide more services to human beings than any other systems, but face the most rapid environmental deterioration. Indian coastal and marine ecosystems are one of the best dynamic ecosystems in the world. These ecosystems provide many services to coastal and national population. The ecosystem services include provisioning services, regulating services, cultural services and supporting services. Food provisioning is in the form of marine fish catch of 3.95 million tonnes (2014) and cost about 52360 crores which provide direct employment to 8 lakh people and further 24 lakhs people indirect employment. The marine and coastal ecosystems of India provide supporting services in the form of a wide range of habitats such as coral reefs, mangroves, estuaries, seagrass beds, brackish waters, and lakes, rocky and muddy bottom.

Environmental Valuation**Provisioning Services**

Provisioning services are the products obtained from marine and coastal ecosystems such as fish, molluscs, seaweeds, shell, fuel, timber, medicine, genetic material and ornamental resources [1]. Food provisioning in the form of fisheries catch is one of the important services derived from all coastal and marine ecosystems. The coral reefs, mangroves, and seagrass beds are vital in supporting fisheries owing to their utility as fish breeding and nursery grounds. Bioprocessing from the seas yields many products such as antibiotics, antifreeze and antifouling chemicals. Coral reefs provide several natural bioactive compounds, which are not available in the terrestrial environment. Mangrove forests are good reservoirs of chemical compounds, wood products and medicinal plants. The conotoxin available in the cone shells of molluscan Family Conidae is highly prized. The dry fin from sharks, air bladder from croakers, gill filaments from rays, pearls from oysters, shells of molluscs is important materials from marine fauna [2].

Regulating services

Regulating services are the benefits, human obtain from the regulation of ecosystem processes. This includes climate regulation, sea erosion control, waste disposal, water purification, air quality maintenance. Mangroves, seagrass, rocky, sandy, mudflats and estuaries play an important role in shoreline protection, sea level rise, and protection from floods and soil erosion, processing of domestic waste and buffering land from storms. Mangroves have an inherent capacity to absorb heavy metals and other domestic effluents making the sea water clean [2]. The coral reefs protect land from waves and storms and prevent sea shore erosion. Estuaries, brackish water and marshes play a vital role in maintaining water cycle and filtering water from domestic wastes. Marine ecosystem play important role in climate regulation by way of controlling carbon dioxide exchange between atmosphere and ocean. The photosynthesis of marine plants absorbs carbon dioxide and release oxygen.

Supporting services

Supporting services include provision of different habitats, primary productivity, and nutrient cycling and soil formation. The majority of the marine species migrates to coastal areas like estuaries, mangroves and seagrass beds for breeding and larval development. Estuaries play an important role as nursery areas for fisheries because it links between coastal, marine, and freshwater ecosystem [1]. Mangroves provide a nursery area for the marine organisms and also help in

nutrient cycling and soil formation. Seagrass beds are an important nursery area, especially for coral reef fishes and invertebrates. Estuaries play an important role for the molluscan resources like clam and crabs. Marine and coastal plants play a vital role in the photosynthesis and productivity of the system [2]. The phytoplanktons in the ocean are the major producer in the marine ecosystem.

Cultural services

Cultural services include tourism, recreation, aesthetic and spiritual services, traditional knowledge and education and research services [1]. Most important cultural services provided by the coastal and marine ecosystem are tourism and recreation. The natural amenities are highly valued by people and contribute to human welfare, thus providing significant economic value. The long stretches of beaches, rocky habitats, coral reefs, estuaries and brackish water. Waterways are the beautiful scenic opportunities. Boating, walking, fishing, swimming, beach riding, scuba diving, religious ceremonies are some of the activities that people enjoying globally and important economic activity [2].

Total economic value

The sum of whole the relevant values, such as use and non-use are called total economic value (TEV). TEV is divided into use and non-use values. Use values express to real use of the good, planned use, or potential use. Non-use value denotes to the willingness to pay to keep some good in existence there is no actual. Three approaches are used in the valuation techniques: Stated preference (contingent valuation and choice modeling); Revealed preference (market price, cost-based, production, travel cost); Benefit transfer. Fisheries resources, wood and non -fishery products can be estimated using the market price methodology. The shoreline protection and other hazard mitigation can be estimated using the tools like mitigative and abortive expenditure and the replacement cost. Mitigation on climate change can be estimated using the market price methodology of carbon storage, sequestration and avoided emissions. Cultural and amenity services can be assessed using the contingent valuation and travel cost method.

Biodiversity valuation of South west coast of India

Assessing biodiversity has been a task in valuing and evolving measurable indicators for its management and conservation. The faunal and floral species diversity and abundance makes the south west of India one of the hotspots of biodiversity as well as an area of key multispecies fisheries [3]. A total of 118 species of seaweeds described, the common belong to the family Rhodomelaceae, Caulerpacae, Cladophoraceae, Ulvaceae and Dictyotaceae. A total of 730 molluscan species was enlisted from southwest coast. Total fish landings from the area were about 1.18 million tonnes (31% of all India landings). Marine fish landings from Kerala was 7.43 lakh tonnes, of which more than fifty percent was contributed by oil sardine, mackerel, threadfin bream, carangids and penaeid prawns. Total number of fishermen population was 6, 10,165 of which 1,30,922 were engaged full time and 10,582 as a part time. Number of fishing crafts along Kerala coast were 21871 of which 3768 trawlers, 60 purse seiners, 460 gillnetters and 495 ring seiners form the capital investment. The value assessed for the ecosystem services and natural capital of Kerala coast is US \$ 1660-1930 billion per year from an area of 260100 Km² which includes brackish water, estuaries and open ocean. Values showed an increasing order from the open ocean, Exclusive Economic Zone (EEZ), continental shelf, estuaries and brackish water area. Thus biological diversity plays an important role for essential ecosystem services and goods, particularly in the form of fish and fishery products [3].

GREEN ACCOUNTING

Environmental accounting offers reports for internal use, creating environmental data to make management choices on valuing, regulating overhead and capital budgeting and external use, disclosing environmental information of interest to the public and to the financial community [4]. Environmental accounting is the practice of incorporating principles of ecological management and preservation into reporting practices and cost benefit analysis. Environmental accounting permits an industry to see the impact of ecologically sustainable practices in everything from their supplied chain to the facility expansion. There are a number of systems of measurement that can be employed at an organizational level to develop a matrix for analyzing the impact of choices made in response to environmental or social imperatives. As mentioned in [5] the green accounting directly places a cost on every environmental parameter and determines the cost of all types of dynamics involved in the ecosystem. This includes pollution prevention, environmental design and ecosystem management.

GRI

The global reporting initiative is an international organisations based in Amsterdam that developed a sustainability reporting framework. The framework establishes performance indicators for measurement of social, environmental and economic impact through business decision making [5]. Reports based on the GRI framework can be used as internal measure or as means to demonstrate compliance with loss. A business that joins the alliance or participates in the training process applies the framework measurement principle to its accounting practices.

ISO 14000

The international organization for standardization has evolved from 9000 to 10000 in 14000. The 14000 series includes protocols that assist with the development of environmental controls and measurement system. Details of the ISO environmental standards have described in detail in [6]. The international environmental management standards are set in the ISO 14000 process. The resulting standards are voluntary for a company and are higher

standards of performance than from regulation. The standard- setting process was set as part of the Global Environmental Initiative in 1992 in connection with the UN Conference on Environment and Development.

Key advantages of ISO 14000 are given below [6].

- (i) To set environment performance standards above regulation and
- (ii) To set the company as environmentally alerts.

The first advantage moves the company above an increasingly complex set of regulations, yet in full compliance. The second advantage puts the company into an internationally competitive position in markets. Both are achieved by incentives to adopt pollution prevention practices.

The following are components of the ISO 14000 standard- setting process [6].

- ISO 14001- the basic framework of an EMS; implements corporate environmental policy
- ISO 14004- a checklist to implement ISO 14001 and method to assess environmental impacts
- ISO 14031- setting objectives and targets of EMS
- ISO 14010- guidelines for environmental auditing
- ISO 14011- guidance for audit procedures
- ISO 14012- qualification criteria for environmental auditors
- ISO 14020- standards on environmental labeling
- ISO 14040- guidance for assessment of product life-cycle environmental impact

Environmental cost accounting (ECA) is the integrating feature of an Environmental management system (EMS). All elements of environmental measures are brought together in the ECA calculation. By recognizing the complete set of environmental costs, the company can be both environmentally responsible (for example, Responsible Care program) and cost- effective in recouping its costs [6].

Methods of Green accounting

The methods used for the green accounting include (i) Natural Resource Accounts (ii) Emission Accounting (iii) Disaggregation of conventional national accounts (iv) Value of non-market environmental goods and services (iv) Green GDP [7]. Natural Resource accounts include data on stocks of natural resources and changes caused by ecosystems. The valuing the changes in the stocks of resources in the nature are difficult due to environmental changes and human interference. Emission accounting identifies the pollutant emission sector and two programs are National Accounting Matrix including Environmental Accounts (NAMEA) and Ecostat of European Union. Desegregation of conventional national accounts, advocates the data in the conventional accounts can be taken to find the relation between expenditure involved in preventing pollution and environmental policy and the value of environmental protection. The value of non-market environmental goods and services are crucial and will reflect the costs of protecting the environmental data as it doesn't include the actual environmental data and accounts are not standardized globally [7].

Kyoto protocol

The most globally reaching actionable example of environmental accounting is the Kyoto protocol. The Kyoto protocol is a legally mandated treaty entered into voluntarily by developing and fully developed nations designed to reduce six greenhouse gases that are supposed to add to global warming [8]. Using matrix established by the United Nations Kyoto protocol measures the change in carbon emissions. National government develops collaborative protocols with industries that produce greenhouse gases or the industries that manufacture products that result in consumer generated emissions [8].

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