

THE IMPORTANCE OF ENVIRONMENT, TOURISM AND DEVELOPMENT IN FISHERIES MANAGEMENT

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ABSTRACT

Various human activities connected to economic development have impacted both positively and negatively on the fishing industry and marine aquatic resources. After an initial review of the industry, the resources and the legal framework, the major factors which influence the sustainable exploitation of marine resources is addressed. A combination of population pressure, industrial development and tourist development have degraded the coastal resource base, eroding the prospects of community-based management. While Sri Lanka has a right to be proud of the measures already taken to safeguard the marine resource, much more needs to be done to ensure sustainable resource management.

1. INTRODUCTION

Widespread depletion of seafood resources caused by coastal pollution, critical habitat destruction and overfishing, is a major problem faced by most developed and developing countries today. In a time of rapid increase in the demand for protein it is more than ever necessary to conserve and manage the productivity of coastal habitats for fish supply as lands are protected for livestock. This is mainly because most fisheries still enjoy open access and there are generally no limits on the growth of fishing effort.

Several decades ago, fishermen believed that the resources of the seas were essentially inexhaustible and that no husbanding of resources was necessary. By the mid 1960s fishery stocks in many areas, especially those close to the ports of the industrial nations, were severely depleted with the rapid increase of the fishing fleet and the use of modern equipment. The traditional response by fishermen to depletion of resources in an area had been to turn to other areas. The possibility of such solutions were however, rapidly decreasing with increasing effort by fishermen in all countries. In this situation most developed countries felt the need of proper management of resources with a right to benefit from them. The basic concept of fisheries management is to control the type and amount of fishing to make sure the resources are not overfished and that each fisherman can continue to get good catches of good sized fish.

Fisheries Management means:

- to know how much fish we have in our waters and where;
- to plan which fishing grounds we could fish more heavily and those which are already heavily fished and on which we ought to be reducing our fishing efforts;
- to take measures, where necessary;
- to control the amount of fishing efforts to improve the quality of fish, to stop

certain methods of fishing that destroy all fish and other aquatic life indiscriminately and to enforce appropriate management measures and to make sure that some fishermen do not spoil it for others by not complying with these measures.

Proper management helps to protect fishing grounds which are the source of every fisherman's livelihood and help to ensure that those grounds continue to support not only today's fishermen, but also their children and their children's children. Also, proper management helps to increase the number of fish available to be caught and to increase the share of each individual fisherman and the quality and value of his catch. Today, the resource base is also used for multiple economic activities, apart from fishing, such as tourism, industrial development and human settlements. Therefore, it is imperative to have a thorough understanding of the effectiveness of these interventions in making management plans for the fishing sector. This report discusses the effects of these factors on the resource base especially the Coastal Zone and proposes an integrated approach to tackle the issues

2. PRESENT STATUS OF THE FISHING INDUSTRY

The estimated fish production of Sri Lanka in 1993, broken down into three sub-sectors is shown in Table 1.

Table 1.
Estimated fish production in Sri Lanka

Sub-sector	(tonnes)
Coastal	169,900
Offshore and Deep-sea	33,000
Inland Fisheries and Aqua culture	18,000
Total	220,900

Exploitation of fishery resources is a crucial element in the country's strategy for increasing its national output in order to enhance the quality of life of its population. The total value added by fish production in 1993 was Rs 2,811 million, equivalent to 1.89 percent of the country's GDP at factor cost prices. Despite its relatively low contribution to the national economy the fishery sector is important as a source of supply of protein. The supply of fish for domestic consumption is met by local supply as well as imports. The local supply as a percentage of total domestic consumption is about 80 percent. The balance of domestic requirements is met by imports. 53,486 t (wet equivalent) of fish were imported to fulfil the domestic requirement in 1993. In addition to providing a considerable proportion of the domestic demand, the fishery sector also helps to earn much needed foreign exchange for the country through exports of mainly fishery products.

The main fish varieties that were caught in the coastal sub-sector are shown in Table 2. Besides the other varieties (small rock fish), those caught in shore seines form the predominant group, 22 percent in 1993. Others constitute relatively smaller proportions, e.g. Skip jack 11 percent; Tuna 7 percent; Rock fish 6 percent. Percentages of the production of high value fish in 1993 are Seer **2 percent**; Prawns **4 percent**; Lobsters 0.5 percent.

Table 2.
Fish Production in the Coastal Sub-sector – 1993

Species	Production (t)
Seer	3,369
Horse mackerel	8,378
Skipjack	19,316
Other blood fish	11,981
Shark	9,446
Skate	9,615
Rock fish	10,277
Shore seine varieties	37,379
Prawns	6,737
Lobsters	862
Others (small rock fish etc.)	41,859
Total	169,900

A major share of the fish production comes from the Coastal sub-sector which employs around 90,000 persons. The Sri Lanka fishing fleet consists of around 27,000 vessels of which 45 percent (12,250) are motorised (Table 3).

The coastal sub-sector which is responsible for 79 percent of the domestic fish production extends up to 40 km from the shore. Most lagoon areas along the coastline serve as fishing centres. Lagoons and estuaries are the breeding grounds for most marine fish species and the habitat of valuable shell fish species such as prawns, crabs etc. Fish production off-shore (the area within 40 to 100 km) and from the deep-sea sector (beyond 100 km and up to the limits of the Exclusive Economic Zone) is comparatively small and in 1993 was only about 11 percent of the total landings. In the early 1980s a foundation was laid for harnessing off-shore resources with the introduction of 10.5 m multi-day fishing boats under the Abu-Dhabi funded North West Coast Fisheries Management Project. Since then the new multi-day boats have consolidated the process and now production in this range is close to 22,000 t a year. However, the offshore fishery in Sri Lanka is still in its infancy due to lack of capital and technological development.

Table: 3
The Sri Lanka Fishing fleet

Type	Number
Traditional non-motorised	14,896
Traditional Motorised	1,986
Introduced vessels fitted with Out Board Motors (Day Boats)	7,934
Introduced vessels fitted with Inboard Engines (Day Boats)	1,907
Multiday Boats	429
Total	27,152

3. RESOURCES

3.1 Marine

Sri Lanka has a coastline of about 1,700 km the majority of which consists of sandy beaches. The varied coastal resources include fin fish, shell fish and several other coastal invertebrates; coastal vegetation including sea weeds, mangrove and coconut; corals and other coastal minerals. These provide the resource base for several economic activities such as fisheries, mining, recreation, tourism, coconut based industries and building construction. Fishing has been a livelihood of fishermen who live close to the sea from time immemorial. At present an estimated 500,000 people depend on it and over 90 percent of the total annual production of fish comes from marine sources. Ninety-eight percent of the marine catch is provided by the small scale coastal fishery which employ around 95,000 persons.

Fishing takes place primarily within the range of the continental shelf which is rather narrow. It rarely exceeds 40 km and averages around 22 km in width. In this area there are good resources of pelagic and demersal fish species with a sustainable yield of 250,000 t annually. Large migratory pelagic species are found in the offshore and deep sea areas extending up to the limits of Sri Lanka's Exclusive Economic Zone. The domestic annual fish production in this range has increased from 2,400 t in 1985 to 33,000 in 1993.

Trawling grounds, especially for prawns are in the northwest Palk Bay area, Portugal Bay area off Chilaw, on the east coast at Mullaithivu and on the west coast in Negombo, Mutwal. Chank fishing takes place in the Gulf of Mannar using traditional methods.

Minerals, mainly sand, heavy minerals and coral are extracted from the coastal zone. Mining for sand takes place on the west coast at Kalutara and Panadura; large quantities are also mined from the mouth of the Kelani River. Surface mining for ilmenite is carried out along the northeast coast of the Island on a relatively large scale at Pulmoddai. Coral reefs fringe many parts of the western and southern coasts, most of the north western and northern coasts and part of the eastern coast. A significant percentage of coastal population in the Akurala, Seenigama and Hikkaduwa areas were dependent on coral mining for their livelihood until recently. The coral provides limestone from which the lime is produced.

3.2 Brackish water

Shallow tidal flats, lagoons, estuaries, mangrove swamps and saline marshes constitute nearly 123,000 ha of brackish water and form a part of the coastal wetland system. These water bodies are important as fish producing centres. The Puttalam, Negombo, Chilaw, Jaffna and the Batticaloa lagoons are well known in this country for their good catches of fin fish and shell fish. Lagoons carry sand into the sea and help to stabilise the coast. Also they provide food and nutrients for the coastal fishery.

Mangrove stands are normally associated with estuaries and lagoons. There are 14 species of true mangrove and 12 species of mangrove associates. Mangroves function as sediment and nutrient traps and are known to be the nurseries for most brackish water and marine fish. They

also help in building up new land because mangrove root systems serve as sediment traps. Most of the mangrove stands found along the west, south-west and southcoasts of Sri Lanka now face extinction due to human interference.

In the north western and northern lagoons, an important fishery exists for the export of beche-de-mer. In more saline lagoons of the northwest, north and northeast, a considerable amount of china moss is available and is harvested on a small-scale.

3.3 Fresh water

The freshwater fisheries potential of Sri Lanka consists of about 162,500 ha covering large, medium and small perennial tanks (including the new reservoirs within the Mahaweli system) and around 100,000 ha of village tanks and ponds. Inland fisheries was accorded high priority by the government before a policy decision was taken to withdraw state patronage to this sector in 1989. Further expansion of this sector is essential in view of its great production potential and the other attendant advantages that it possesses such as its non-dependence on imported fossil oil, its significance as a source of cheap protein for the rural people as well as an important source of employment and income for the rural population.

Table 4.
Import of fishery products to Sri Lanka – 1993

Item	Quantity (t)	Value (Rs million)
Dried Fish	42,465.92	1,421.42
Maldive Fish	4,011.35	348.05
Canned Fish	7,008.26	417.40
Others	0.39	0.32
Total	53,485.92	2,187.19

3.4 Imports

The fishing industry of Sri Lanka during the mid 50's produced around 27,000 tons of fish annually and provided only about 50 percent of the domestic requirements and the rest had to be imported. The underdeveloped state of the of the country was mainly due to the limited knowledge of resources and the continued use of primitive types of craft and gear. Also the operations had been carried out mainly as a cottage industry with no capital or credit to expand. The industry was unattractive due to the fact that it was exhausting work and physically dangerous. Its workers remained the poorest section of the community living in slums and using out-moded fishing equipment. By the end of the 1960s the position of imports had improved a bit and the import substitutes dropped to about 30 percent. Of the 53,486 t of fish products imported in 1993 dried fish accounted for 16 percent, canned fish for 3 percent and Maldive fish 1.5 percent (Table 4).

3.5 Exports

The fisheries help to earn foreign exchange through the export of highpriced fishery products, in addition to providing a significant proportion of domestic demand. In 1993, exports amounted to 5,895 t (wet equivalent) of fish and fishery products, the value of which was Rs: 2,144 million.

Table 5
Export of fishery products from Sri Lanka – 1993

Description	Quantity (t)	Value (Rs. million)
Prawns	1,426.44	808.08
Lobsters	311.57	209.21
Crabs	546.33	82.22
Beche-de-mer	37.33	25.63
Ornamental fish	290.68	204.91
Chunks & shells	121.89	19.87
Shark fms	58.60	98.93
Molluscs	154.51	47.61
Fish maws	1.75	0.82
Frozen fish	2,900.74	625.07
Fat&oiloffish	45.56	21.79
Total	5,895.40	2,144.09

The most important export product was prawns: 1,426 t (24 percent), having a value of Rs: 808 million (38 percent). There seems to have been a steady increase in the export of ornamental fish during the past few years. Table 5 gives the quantity and value of exports during 1993.

4. TILE LEGAL FRAMEWORK

Legislation directly affecting the management and development of fisheries includes:

4.1 Maritime Zones Law No.22 of 1976

The law provides for the President to proclaim the limits of the Territorial Sea, Contiguous Zone, Exclusive Economic Zone (EEZ), Continental Shelf, Pollution Prevention Zone and Historic Waters. Under the law all natural resources in the EEZ both living and non-living are vested in the Republic. The Republic has the following rights in this zone.

- Sovereign rights for the purpose of exploration, exploitation, conservation and management of the natural resources, both living and non-living, as well as for the production of energy from tides, winds and currents and for other economic uses.
- Exclusive rights and jurisdiction to authorise, regulate and control scientific research.
- Exclusive right and jurisdiction for the construction, maintenance or operation of artificial islands, offshore terminals, installation and other structures and devices necessary for the exploration and exploitation of the resources of the zones, for the convenience of shipping, or for any other purposes.
- Other rights recognised by international law.

A proclamation was made by the President under the law in 1977 establishing the limits of the territorial sea at 12 nautical miles, the contiguous zone at 24 nautical miles and the FEZ and the pollution prevention zone at 200 nautical miles, or at the maritime boundary with India in the Gulf of Mannar and the Bay of Bengal.

4.2 The Fisheries Ordinance

The Fisheries Ordinance as amended by law no. 20 of 1973, law no. 46 of 1973 and law no. 7 of 1976 is the basic law on fisheries in Sri Lanka. The ordinance provides for prohibition of dynamiting or poisoning of fish or the destruction of gear and the restriction of export of certain fish and eggs. The amended Act no. 30 of 1956 made it an offence to knowingly possess or expose for sale dynamited or poisoned fish, widened the scope of matters referred for public inquiry and gave wider powers to the Minister to make regulations regarding a fishing dispute. Thus fishing laws have been steadily expanded and tightened to stop all abuses of both the fishery resources of the country and the interests of various fishing groups.

Laws to prevent the dynamiting or poisoning of fish are an urgent scientific necessity to conserve fishing stocks. Dynamiting or poisoning fish is an extremely wasteful method of fishing as it destroys immature fish and eggs and also kills large numbers of mature fish which are not collected as they scatter or sink to the bottom of the sea. Inland waters have also been subjected to this type of wanton destruction.

4.3 Fisheries Regulations

One of the earliest methods of Fisheries administration had been the necessity of making laws to settle or avoid fishing disputes and to prevent destructive methods of fishing. These laws were made under earlier enabling Acts dating back to 1898 including The Village Communities Ordinance 1889 and The Game Protection Ordinance 1908. The regulations deal separately with sea fisheries and inland fisheries. The sea fisheries regulations are concerned primarily with regulating the use of beach seines, restricting the use of certain gear in specified waters, and controlling migrant fishermen. Some of these appear to have confirmed the existence of customary practices. A community-based approach is visible in most cases.

The open access nature of fishing and the increased fishing effort over the years led to conflicts among groups of fishermen engaged in different types of coastal fisheries. As a result, the existing fisheries regulations were found in practice to be either vague or not uniform in character and so a new set of regulations were made under the Fisheries Ordinance in 1941.

Regulations adopted in 1973 specify certain conservation measures, including minimum sizes for lobsters and prawns. Exporters of spiny lobsters are required to be licensed and processors of both spiny lobsters and prawns are required to maintain records of material processed.

4.5 Other relevant Ordinances

The Whaling Ordinance, enacted in 1936, provides for the regulation of whaling in Sri Lanka's coastal waters. In general, the provisions have no practical importance as no commercial whaling operations have been established in Sri Lanka.

The Pearl Fisheries Ordinance: prohibits fishing or diving for pearl oysters or using a vessel for such purposes except under a pearl fishery licence. No regulations have been made under the ordinance and in practice no pearl fisheries have taken place since 1959.

The Chank Fishery Act prohibits the use of any vessel for chank fishing, unless it is registered under the Act.

Fauna & Flora Protection Ordinance provides for the establishment of national reserves (including strict natural reserves, national parks, nature reserves, jungle corridors and intermediate zones) and sanctuaries, in which the hunting of wild animals (including fish) is prohibited. Animals protected outside natural reserves include dugongs and leathery turtles.

Under The Forest Ordinance the use of poisons or explosives for fishing and the poisoning of water are prohibited.

Crown Lands Ordinance provides for the issue of permits for the occupation of any part of the foreshore or bed of the sea. In practice this power is being exercised to regulate the location and use of beach seines.

4.6 Legislation relating to the control of pollution

The Water Resources Board Act provides for the prevention of pollution of inland water resources and the formulation of policies for the multipurpose development and use of water resources.

Other environmentally significant legislation includes – Plant Protection Ordinance, Land Development Ordinance, Factories Ordinance, Irrigation Ordinance, The Felling of Trees Ordinance, Soil Conservation Act., Mines & Mineral Law, Urban Development Authority Law, National Water Supply & Drainage Board Act.

The National Conservation Act No. 47 of 1980 shows the government's recognition of the need for a set of comprehensive laws. This was amended in 1988 to provide regulatory powers to the Central Environmental Authority (CEA). Under the Act, a licence issued by the CEA is required to release wastes into the environment. Other provisions relate to the pollution of inland waters and of the atmosphere. Several other Acts of far-reaching environmental significance are: Control of Pesticides Act, National Aquatic Resources Agency Act, Coast Conservation Act, Marine Pollution Prevention Act, and Natural Resources, Energy and Science Authority of Sri Lanka Act.

Provisions for coastal conservation were originally found in Part viii of the Crown Lands Ordinance dealing with the foreshore. The Coast Conservation Act 1981 calls for survey of the coastal zone, preparation of a Coastal Zone Management Plan, regulation and control of activities within the coastal zone and the formulation and execution of schemes of work for coast conservation. Other features of the law are (i) broadening the definition of the coastal zone to include some portion of the water area of lagoons, estuaries and rivers, (ii) a uniform procedure for permit application for development activities in the zone, (iii) provision for collaboration

among various government agencies involved in research and development activities within the zone, (iv) control measures, and the (v) penalties for violation of the law.

5. MAJOR FACTORS THAT INFLUENCE THE DEGRADATION OF THE COASTAL RESOURCE BASE

Coastal areas are used extensively for a number of activities which may not be compatible and may result in a wide array of problems for resource users and policy-makers. Environmental degradation of the coast is caused by three major factors:

- population pressure as a result of increased human settlement,
- development of industries in the coastal zone,
- tourism development.

5.1 Population pressure

The country's population in 1994 is estimated to be around 18.9 million and the national annual increase in the population is 1.6 percent. The number added each year is thus about 400,000. There is a steady increase of pressure on the maritime water front by squatted settlements living under insanitary conditions. About two-thirds of the thickly populated urban areas are located along the coastal belt. This has led to consumption of resources at a speed which overtakes their renewability. The environment's resource capital becomes threatened, thereby compromising the ability of the state to provide food, security, health care and education. Improvement of the population's living standards also becomes difficult. Other problems arising from population pressure are:

Loss of mangrove forests due to heavy dependence of the human population on a variety of products such as timber, tannins, firewood and other products which they obtain from mangrove forests.

Coral reef destruction leading to reduced yield of fish species associated with reefs; reduced tourist attraction and loss of ecosystems due to

- dynamiting to harvest fish,
- harvesting of coral for lime production or, in the case of exotic coral species for sale to tourists,
- siltation of coral from erosion associated with deforestation,
- death of coral from deleterious effluents associated with oil spills.

Congestion and intensive use of coastal resources such as fisheries, due to high population and continuing growth, expansion of the tourism industry, and expansion of commercial and industrial activity.

Inadequacy of institutional structures to address coastal resource problems and to administer management, regulation, and enforcement where needed.

Depletion of wildlife: Depletion of species such as turtles, dolphins, whales and other aquatic life.

Pollution of the coastal environment adversely affects fisheries yield and tourism revenues due to industrial wastes, sewage, agricultural pesticide runoff, oil spills from sea going vessels and toxic contamination of fish and shell fish.

Beach and coastline erosion caused by destruction of mangrove stands; construction of coastal installations which alter current and wave action patterns; or mining of beaches for sand.

Swampland infilling reduces fish spawning and nursery habitat and reduces fisheries yields.

Over fishing leading to reduced fisheries yield and in some cases species extinction.

5.2 Development of industries

Industrial development leads to problems of disposal wastes and by-products many of which are harmful in the short or long term. Industrial wastes are often emitted into the air, dumped on to the land or released into fresh water bodies or the sea. Also, coastal factories have often destroyed mangrove or other critical habitats which are obliterated by sea walls, docks, landfills, and buildings. However, the development of industries is essential for correcting the country's balance of payments deficit and generating employment opportunities. Industrial developments up to now have been achieved at the cost of a degree of environmental pollution. Industrial pollution receives much greater attention than pollution caused by agriculture as the effects are much more visible and the source of pollution is generally traceable. Many of the industrial wastes contain a variety of toxic substances including heavy metals (lead, mercury, cadmium etc.), acids and innumerable other toxic industrial chemicals. Accidental oil spills are becoming increasingly more common as sea traffic increases, facilities are built and the dependence on fossil fuel grows. In a small island ecosystem such as Sri Lanka, the impacts can be felt even more, as important habitats are much smaller in scale and as such may have an increased vulnerability.

5.3 Tourism development

Tourism is an economic activity that was introduced to Sri Lanka in the mid 1960s. This was identified as an important source of foreign exchange earnings and for employment generation. Enactment of the Ceylon Tourist Board Act No: 10 of 1966 and the subsequent Ceylon Tourist Development Act No: 14 of 1968 and the Ceylon Hotel Corporation Act of 1968 laid the necessary institutional basis for the development of tourism.

Sri Lanka's 1,700 km. of beaches and the associated biological resources such as fish, coral reefs and shells received the main focus as tourism resources during the initial stages of development. Throughout its first stage of development this emphasis remained unchanged with about 70 percent of all the hotels and 77 percent of the rooms being located in the coastal regions by 1976.

During the mid 70s the industry acquired as added dimension in the growth of an informal low cost tourism sector. The continued increase in the number of arrivals and the resultant demand for accommodation and other services saw the growth of centres in Negombo, Hikkaduwa, Kalkuda and Arugam Bay. Facilities at these places were constructed by the informal sector as a reaction to the growing demand within a short time and did not adhere to the conceptual requirements established by the earlier tourism plans. These developments subsequently created adverse environmental problems.

The tourist industry has shown a remarkable recovery during the past few years having been severely depressed since the eruption of civil disturbance in 1983. At present over 300,000 tourist arrivals are recorded annually. According to Tourist Board sources, the gross foreign exchange earnings from this sector in 1990 was Rs. 4,800 million (SDR 88 Million), showing an increase of 75 percent over the earnings of the preceding year.

The total employment provided by the Tourist Industry is about 65,000 of which about 30,000 are directly employed in the industry, while the balance (35,000) are employed in ancillary sectors. The major impact areas in terms of accrued gains in the form of higher incomes and new employment opportunities are Colombo, Mt. Lavinia, Negombo, Bentota, Uuawatuna and Hikkaduwa. Due to the very nature of tourism, as a high income generator, this has led, in some areas, to a decline in manpower participation in the relatively more uncertain income generating, traditional activities such as fishing.

The social effects of tourism have been identified to have been both positive and negative. While tourism has widened the knowledge and understanding of different cultures of the people in receiving areas, and increased the literacy levels, it has also led to the advent and increase of some social ills. Unplanned tourism development in some areas has resulted in problems such as loss of beach fronts, the need to construct structures for protection of tourists and the reduced ability to compete with alternative facilities. Hotels constructed north of the Bentota river estuary also had to construct emergency structures due to coastal erosion in 1981.

Most coastal tourist developments added extensions and these resulted in problems of waste disposal because the increased capacity could not be contained in the limited space available after these extensions. Pollution from these sources affected the coral reefs and other biological life thus depleting the quality to the marine environment.

Due to bad planning practices, tourism has left its mark on our shores. Several large tourist hotels have been constructed on the coast sometimes at the expenses of lagoons and mangroves. Hotel construction has also pushed fishermen from their traditional fish landing sites.

6. CONCLUSIONS

- The threat to the environment is not unique to Sri Lanka alone. It is a global problem, but the Sri Lanka Government is among the first to prepare a National Conservation Strategy in order to address the problems.

- Sri Lanka has developed to a level where it is making a significant contribution to improving the national diet. Present priority needs are: quantitative data on the resources available in different zones, technological safeguards against over fishing, and a management plan to ensure sustainable yields from the country's fisheries. Therefore, a comprehensive survey of the resources should be undertaken immediately.
- A fuller assessment is required of the ill effects of activities such as tourism and industrial development on the fishing potential.
- The first preference in all conservation or resources utilisation activities which bring them socio-economic benefits should be given to the local inhabitants and to their participation in protecting resources for sustainable use.
- Pollution of the fresh water or marine environment by industrial and other effluents must be strictly controlled.
- Tourism must be developed in a manner that minimises adverse effects on the fishing industry.
- Procedures must be formulated to regulate activities of unauthorised tourism dependent establishments along the coastal belt.
- Mangroves and adjacent lands should be immediately identified for purposes of management.
- The legislation relating to the environment is scattered in a number of statutes. There are too many laws, some in conflict with each other. These should be reviewed and revised in order to ensure that they are adequate to effectively meet present day needs of resources management.

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