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# The application of a proposed generic institutional framework for integrated coastal management to India

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## Abstract

The complex and dynamic nature of the coastal and marine area is prompting many nations to consider the internalisation of integrated coastal management (ICM) policy as part of a deliberate strategy for sustainable development. The institutional structures required to deliver such internalisation are subject to debate. This paper presents a suggested generic institutional framework derived through consideration of the core ICM process and proven organisational models. The proposed framework consists of an 'operating core' which facilitates local issue identification, evaluation and monitoring; an 'administrative component' of Central and State government to set policy direction, manage funding, and provide guidance on implementation and operation; a 'strategic apex' within Central government to oversee the transition from ICM concept to practice; and a 'co-ordinating mechanism' to allow open communication of ideas and information. The proposed framework is then applied to India, which currently faces the challenge of developing a suitable institutional framework to deliver ICM aspirations. It is concluded that the generic institutional framework works well when applied to India, with existing organisations and agencies requiring relatively minor organisational changes to address coastal and marine issues more effectively. © 2002 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

Agenda 21 identified the sustainable management of coastal and marine areas as one of the essential components of the global life-support system [1]. The geographic

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focus of sustainable coastal and marine area management is where human activities are interlinked with both the land and sea environments. Integrated coastal management (ICM) is a mechanism which seeks to combine the management of the land and the adjoining water within a unified framework [2], and in doing so, deliver the aspirations expressed in Agenda 21.

The need for some form of ICM in India is great, despite signs of greater priority being given to coastal and marine issues in recent decades. Key milestones in this evolution include the promulgation of the Maritime Zones Act in 1976 and the establishment of the Department of Ocean Development in 1981 [3]. An Ocean Policy statement, published in 1982, stressed the need for a policy structure to facilitate a dynamic thrust in ocean development and called for effective systems of management and control of the ocean environment [3]. In 1998, the Department of Ocean Development established the ICM Project Directorate to build ICM capacity at both the national level and within the maritime States and Union Territories of India [4]. To develop capacity, the Project Directorate is in the process of producing model ICM plans for Chennai—a fast developing city—in Tamil Nadu State; the State of Goa—an area of intense coastal tourism; and the Gulf of Kachchh—a critical coastal and marine habitat—in Gujarat State [4].

These initial national endeavours demonstrate an emergent recognition of the importance of coastal and marine areas in India. The Indian approach, however, remains reliant upon a single sector, with little apparent interagency co-ordination, and limited prioritisation of the cumulative impacts of multiple uses [5]. The challenge for India is to create an effective coastal and marine area management programme and to encourage government interest in the ICM concept [6]. In such a situation, the first priority should be to create a framework that has the mandate, human and financial resources, and the political will to put the concept of ICM into practice [7].

This paper proposes a generic institutional framework to facilitate the transition from ICM concept to practice. The suggested framework is then applied to India. In order to inform the development of the framework, a programme of structured interviews was undertaken in the summer of 2000 with practitioners involved in coastal and marine management in India. The principal aim of the interviews was to study the hierarchical structure of attitude in current coastal and marine area management practices and the willingness to consider an alternative approach. The methodology employed to analyse the interviews incorporated Guttman's scalogram analysis [8], in which a substantive statement (item statement) was tested through consideration of the answers supplied to three separate questions. This allowed an objective judgement to be made regarding whether the respondent agreed or disagreed with the item statement. Each item statement related to either the existing coastal management framework, or the respondent's opinions concerning the future direction of coastal management in India. The exploration and development [9] of a generic framework for ICM is then related to proven private sector organisational models (as shown in Fig. 1).



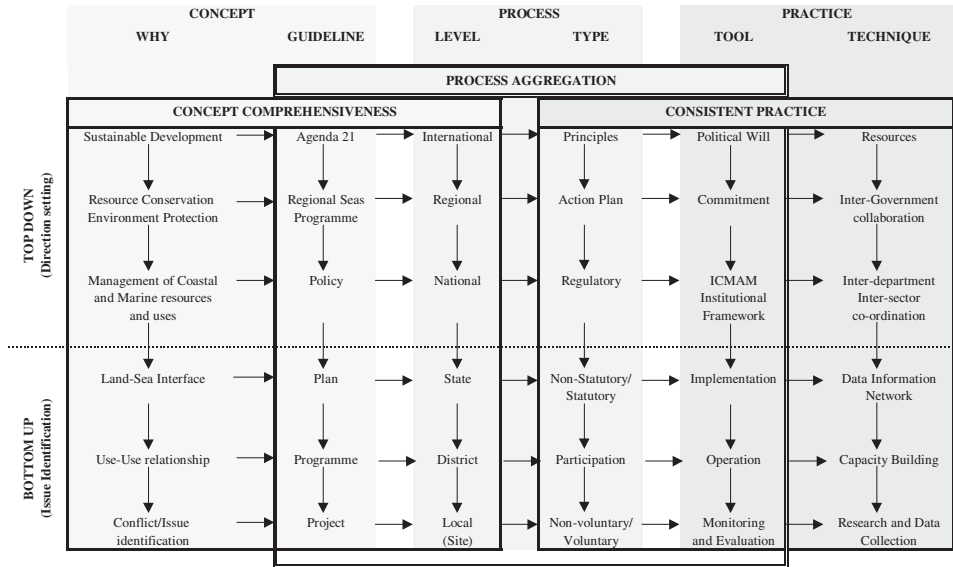


Fig. 2. ICM concept to practice.

Thus, it can be argued that irrespective of the approach to ICM, there needs to be a national level institutional framework to facilitate the development of ICM practice.

Interaction in the coastal and marine area is as illustrated in Fig. 3. The challenge to transform the interaction lies in developing the political will to improve communication between all stakeholders concerned with the environmental, economic and social significance of the coastal and marine area [11,13]. The transformation process, illustrated in Fig. 4, can fall apart because of a breakdown along one or more of the axes of change: ‘top-down’, ‘bottom-up’ and core process. Together, the three form a balanced and integrated framework for combining separate initiatives into a coherent overall strategy. The outcome depends on establishing a ‘language of change’ that all stakeholders can speak and understand [14].

Visser (1999) argues that there is a need to facilitate universal logic or ‘reason’ in decision-making by government officials, scientific experts and the community [15]. In this context, effective management is a question of proper institutional design, in which the right balance must be found between national, state and local control in order to achieve the collective and sometimes conflicting goals of different programmes [16]. For example, in the Association of South East Asian Nations (ASEAN) initiative, “institutional and organisational arrangements were imperative in carrying out the projects and programmes” [17]. Lessons learned from experience in the Netherlands “demonstrates the need for building an organisational structure for the relevant participants to communicate about problems and solutions” [18]. Friedheim (2000) addresses the central focus of the debate by stating that “the challenge lies in developing practices and institutions that are consistent with the

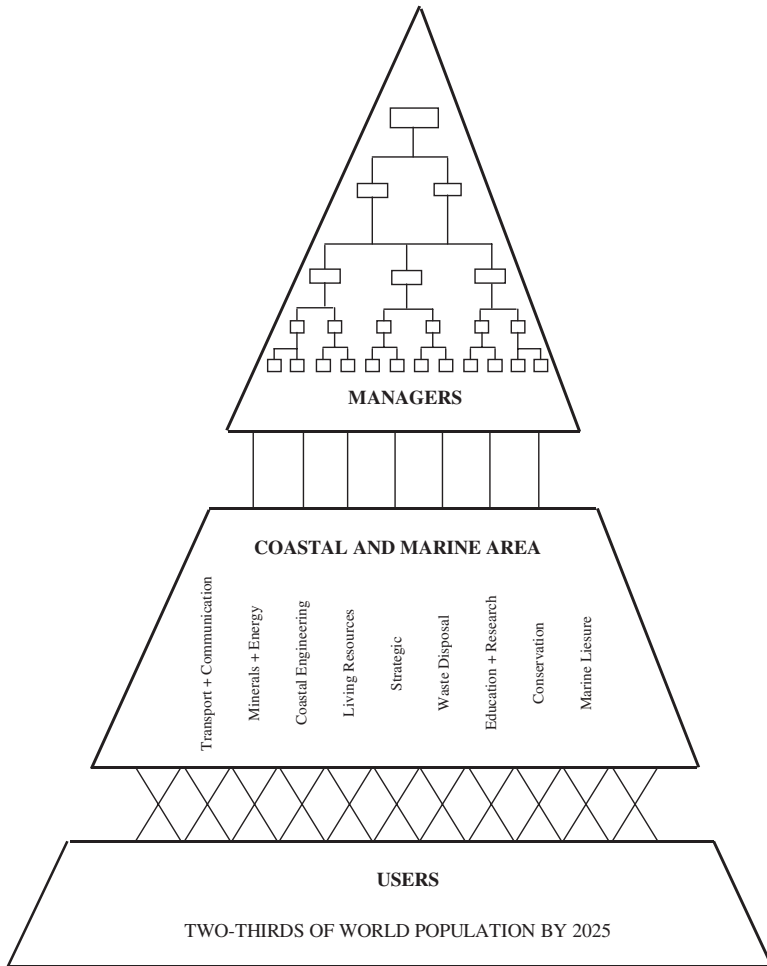


Fig. 3. The interaction triangle.

principles we recognise as right, but whose implementation is difficult” [19]. In general, therefore, it can be argued that limitations in institutional capacities are the main barrier to improved resource planning and management [20].

The existence of an ‘institutional barrier’ also suggests that national level coastal and marine area management programmes may need to move away from a standard management procedure in which a ‘science’ arrangement provides advice to a ‘management’ body, to a system where management options are based on the precautionary principle. This is particularly important as coastal management decisions are often made despite important unknowns and conflicting opinions on the ‘right’ course of action. This requires a sustained effort of ‘learning by doing’ that could extend for many years before the sustainability of coastal and marine

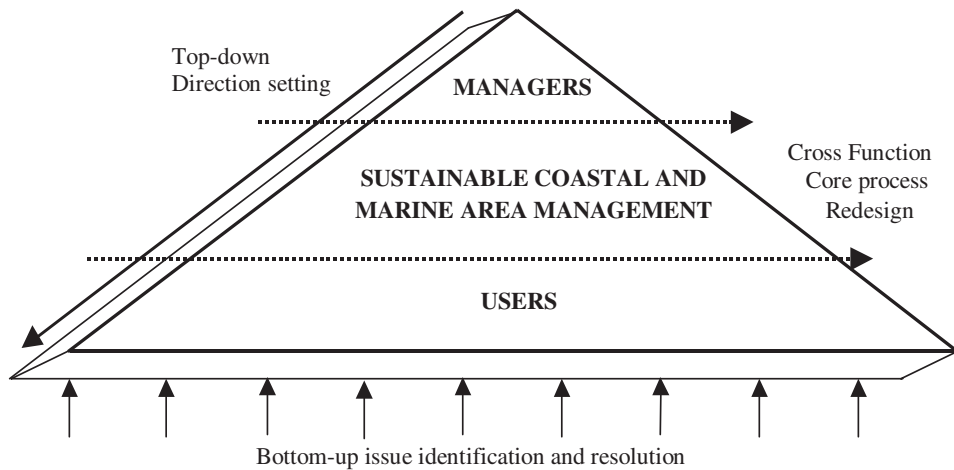


Fig. 4. The transformation triangle.

areas becomes tangible. However, in most nations, coastal management takes the form of disjointed projects with limited time frames, rather than distinct elements of a coherent, overarching strategy. The geographic scale at which effective coastal management should be practised also suggests that any progression towards a national ICM approach is also likely to be incremental. Furthermore, the involvement of all significant stakeholders in an ICM programme is seen as essential in order to engender enhanced stakeholder 'ownership' of, commitment to, and belief in, the management process. Through this type of approach, the readiness of stakeholders to address actual and perceived conflicts is likely to be enhanced. Sorensen (1997) asserts this point by stating that "first, last and always, horizontal and vertical integrated planning and management are necessary if practitioners are to effectively and efficiently plan and manage coastal systems" [21].

Drawing on the work of several authors [2,6,7,22,23], the core process needed to develop a national level institutional framework for ICM is illustrated in Fig. 5. The ICM core process is site-specific which allows for temporal, spatial, sectoral and stakeholder integration. Consequently, it facilitates the design of sustainable policies, plans, programmes and projects for the coastal and marine area, as illustrated in Table 1 using the port sector as an example.

An institutional framework that facilitates such a cross-functional ICM core process and which includes a 'top-down' direction setting and 'bottom-up' issue identification and resolution should result in the implementation of a successful ICM strategy. However, the institutional framework has to be based on an analysis of the particular social, economic, cultural and political setting of a nation [6]. There are no 'best' or 'right' solutions. The framework cannot be constructed (nor dismantled) overnight because of the underlying cultural ideas and power relationships within an organisation [15]. It raises difficult issues in the distribution of authority, responsibility and power within a nation. Dealing with these issues requires vision,

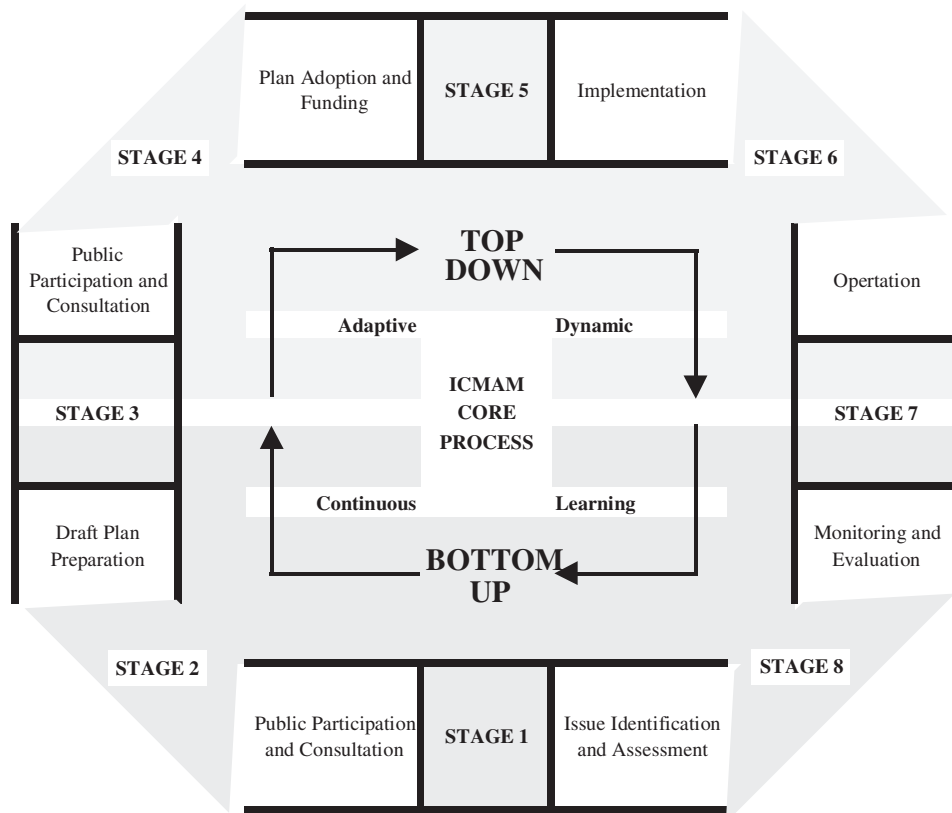


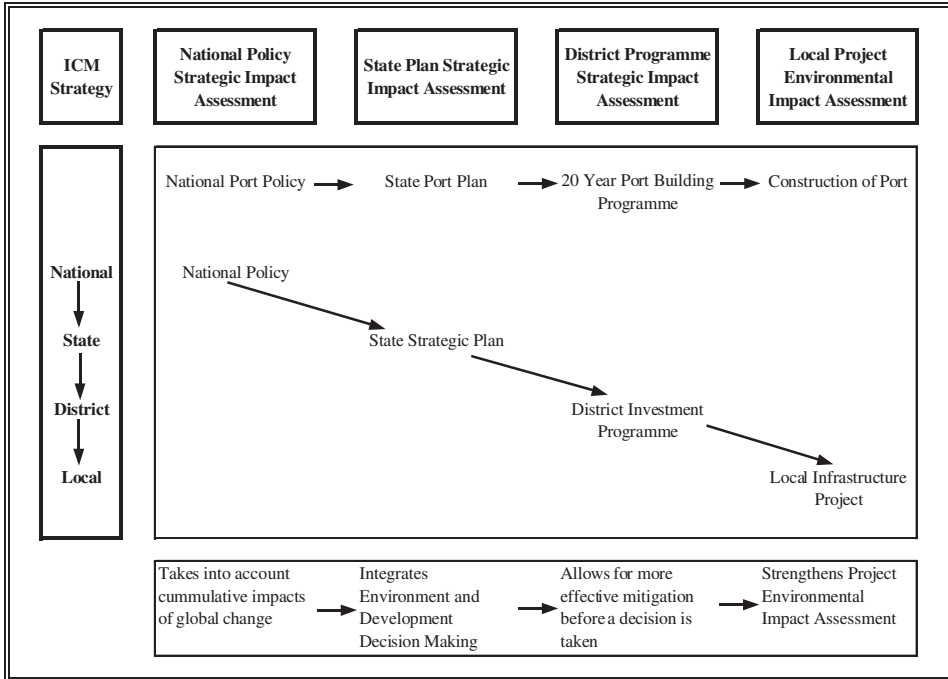
Fig. 5. ICM core process.

leadership and courage [24]. Sustainability depends on co-operation between the different stakeholders, and ultimately, the aggregation of their long-term interests. This does not have to mean a net loss in power at higher levels in the governance hierarchy [24], although the framework will provide power-holders with the capacity to accommodate conflicting perceptions and priorities, essential to achieve sustainability. Based on the cross-functional ICM core process, Fig. 6 provides an interpretation of an ICM framework that can be applied by coastal nations developing their own institutional frameworks.

### 3. Current ICM practice in India

This section of the paper sets the national context for the application of a generic ICM institutional framework to India. The social, environmental and resource characteristics of India are first considered, followed by an examination of the

Table 1  
ICM Policy Plan Programme Project integration



national governance structure. The current coastal and marine area management framework is then summarised. The material contained in this section is drawn heavily from the comments made by respondents during the interview schedule.

3.1. National context

India is the seventh largest country in the world and Asia’s second largest nation. It has a landmass of 3,287,263 km<sup>2</sup>, a land frontier of 15,200 km, an Exclusive Economic Zone (EEZ) of 2.02 million km<sup>2</sup>, and a coastline of 7516 km (including the island territories) [25]. Peninsular India and the island territories comprise 9 States and 4 Union Territories.

As the world’s largest democracy, India is a country of striking contrasts and enormous ethnic, linguistic and cultural diversity [25]. There are more than 1600 languages, nearly 400 of which are spoken by over 200,000 people [26]. The country is home to more than 1 billion people, of which about 250 million people live near the coast [27]. Indian society is characterised by social inequality, economic disparity and a general attitude of government dependence [28].

India is one of the 10 most industrialised countries in the world [25]. It is the eighth largest economy [25], which has grown by an average of 6.8% during the

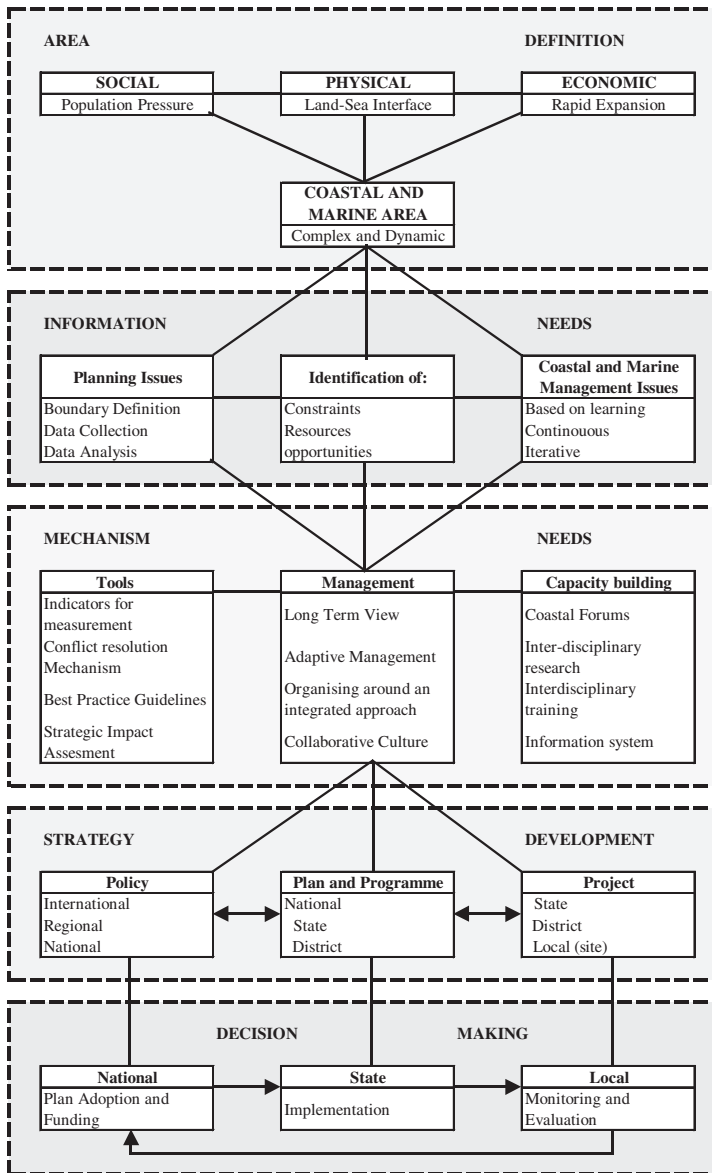


Fig. 6. The ICM framework.

eighth five-year plan (1992–1997) period [29]. The ninth five-year plan (1997–2002) is expected to set the stage for growth in the post-plan period that could be as high as 7.7% [28]. There are 11 major ports and 148 minor operable ports along India’s long coastline [29]. The major ports handle ~90% of all-India port throughput. The existing port infrastructure is insufficient to handle trade flows effectively and Indian

ports continue to show lower productivity in comparison to other ports in the Asian region [29].

India is the sixth largest producer of fish in the world and second in inland fish production. The annual potential yield in the EEZ has been assessed to be 3.92 million tonne [30]. An estimated 200,000 traditional crafts carry out small-scale, subsistence fishing activities. There are also about 34,000 mechanised boats and 180 deep-sea fishing vessels operating mainly out of ports in the States of Maharashtra, Kerala, Gujarat, Tamil Nadu and Karnataka [30]. At present, there are 395 freezing units, 13 canning units, 102 individual quick freezing plants and 477 cold storage units [29]. Export of marine products during 1998–1999 exceeded US\$1 billion [29].

Given the economic, environmental and social significance of tourism in India, the government developed a national strategic plan for the development of tourism in 1996, based on the 1982 tourism policy [31]. Increasing tourism provision is planned for the mainland coastlines of Goa and Kerala and the island territories. There is considerable tourist potential in the Gulf of Mannar, Sunderbans and the Chilka Lake. The West Coast of Rameswaram has considerable amenity value for watersports and other tourist attractions [32]. It is estimated that tourism accounts for 2.4% of the total employment in the country with the direct employment of 9.1 million and indirect employment of 12.3 million [31]. Although tourism to India accounts for only 0.38% of the world's tourism market, it is the second largest foreign exchange earner in the country [31]. About 2.37 million foreign tourists visit the country every year bringing nearly US\$3.15 billion in foreign exchange [31].

India's biodiversity merits five world heritage sites, 14 biosphere reserves, six Ramsar wetlands, and is one of the twelve global centres of origin of cultivated plants [33]. In total, about 4.4% of the land area is protected for its nature conservation value [33]. India, with 2.4% of the world's hot spot area, has 8.1% of the world's total biodiversity with one of the two hotspots the Western Ghats on the West Coast [33]. The aquatic ecosystem of the country supports 30% of the world's flora and 6.67% of world's animal species [33].

Currently, more than 90% of pollutants generated in India are released into the coastal zone [34]. Domestic sewage, mostly untreated, contributes the largest volume of waste, with 4 billion m<sup>3</sup> reaching the coastal environment every year [34]. Major industrial cities and towns, such as Surat, Mumbai, Kochi, Chennai, Vishakhapatnam and Calcutta, are situated on or near the coastline. The total quantity of industrial waste generated is estimated to be 40 million m<sup>3</sup> [35]. Agricultural production uses large quantities of fertiliser and pesticide to meet the demand. As a result, about 50 million m<sup>3</sup> of river-borne effluents, 33 million tonne of land wastes and 5 million tonne of fertiliser residue are discharged into the coastal and marine environment every year [34]. A nation-wide marine pollution-monitoring programme, in operation for the last 10 years, has found that the sea beyond 2 km all along the coast except in Mumbai is 'clean', and in case of Mumbai, it is 'clean' beyond 5 km [34].

India's rapid industrial, population and economic growth are causing severe environmental degradation and pollution problems with local, regional and national impacts [36]. Infrastructure developments such as mines, road, port, dam and canal

construction have also resulted in the degradation of the coastal and marine biodiversity [36]. Whilst such development provides employment opportunities, it also leads to increased inward migration which compounds existing problems [37]. The Planning Commission of India identified growing population, urbanisation, changing agricultural, industrial and water resource management amongst the issues that have resulted in perceptible deterioration in the quality and sustainability of the environment [28].

### *3.2. Government structure*

A sovereign, socialist, secular, democratic, republic, India has a parliamentary system of government with a federal structure [38]. There is a three-fold distribution of legislative power between the Union and the States. Government is transacted through ministries and departments created by the President on the advice of the Prime Minister under the Government of India (Allocation of Business) Rules, 1961 [25]. At present, the government consists of 43 ministries and at least 61 departments [25]. This, in itself, indicates a somewhat sectoral approach to management. For the first time, in India's 50th year of independence, the ninth five-year plan (1997–2002) has called for the creation of effective institutions for participatory planning processes. This requires that not only the Union and State governments, but also the people at large, participate in providing direction and balance to the socio-economic development of the country [28].

To administer the coastal and marine area, the Maritime Zones Act, 1976 lays down the jurisdictional boundaries of the Union and individual State governments [39]. In 1986, the Ministry of Environment and Forests promulgated the Environment Protection Act, derived from which is the Coastal Regulation Zone (CRZ) notification, 1991 [40]. These regulations were aimed at regulating development and controlling excessive exploitation of coastal resources. National and State Coastal Zone Management Authorities (NCZMA and SCZMA) were constituted for the first time in 1998 [41]. However, these are not representative of all stakeholders with an interest in the coastal and marine area.

The present development control process is regulatory in nature [42]. The relevant State government has the power to issue permissibility certification for a proposed development, subject to consideration by an expert committee in the Ministry of Environment and Forests. This environmental clearance is dependent on a project-based Environmental Impact Assessment (EIA) [43]. As an attempt to ensure cross-sectoral input to environmental appraisal, six expert committees (on mining, industry, thermal power, river valley, infrastructure development and nuclear power) have been constituted within the Ministry of Environment and Forests [40]. The State authorities through the State Pollution Control Board (SPCB) and the State Directorate of environment undertake development monitoring [40].

A review of 187 centrally managed major national projects undertaken by the Department of Programme Implementation (DPI) showed 118 projects behind schedule as on February 1997 [28]. Among the factors identified as responsible for

this poor rate of implementation were: inadequate field investigation; lack of adequate data; inadequate analysis of environmental and rehabilitation implications; delays in clearance from various regulatory agencies for land acquisition and procurement of materials; poor project co-ordination and planning; changes in the scope of a project midway through execution; and inability of project managers to take prompt decisions on various aspects of these projects [28].

The Planning Commission has also considered nearly 170 evaluation studies, and State evaluation organisations have completed 2200 evaluation studies of development schemes during the last 40 years [28]. From these reviews, it has emerged that during programme formulation there is inadequate analysis of information, largely due to the lack of an established mechanism for ready access to relevant information. In areas of social concern, the formulation of a multiplicity of programmes has resulted in available resources being spread too thinly, leading to sub-optimal project outcomes. Programme implementation agencies have been created without the necessary associated institutional changes, leading to implementation by existing departments working independently for different components of a programme. A lack of accountability and inadequate allocation of funds to implementation agencies is also identified as a major constraint to successful implementation. An underlying financial problem faced by the government is integrating long-term planning into short-term annual budgetary process [28].

India, therefore, is a highly complex nation, rich in natural and human resources. However, its governance system is characterised by a legacy of bureaucracy and a record of poor project implementation.

### *3.3. ICM current practice in India*

The Indian approach to coastal and marine area management is both sectoral and regulatory. India's sectoral approach is reflected in the multiplicity of ministries and departments created to administer independent sectors. This is compounded by limited co-ordination between the ministries and departments. For example, a port cannot be subjected to any law other than that of the Port Management Authority; the Public Works Department responsible for coastal defense does not consider activities of other departments in its efforts to protect the coast; similarly, the State Ministry of Environment has little influence over the State Housing Board responsible for domestic sewage disposal [44,45].

Deep-rooted institutional deficiencies, an incompatible administrative system, and a non-enterprising behavioural attitude of those in government, which, historically, has hindered economic development and social change, reinforce the sectoral and regulatory ethos [28]. Table 2 provides a comparison of the current ICM situation in India with the core objectives, principles and initiatives identified by the international community as necessary for the ICM process. Given this ICM context, certain organisational issues require further consideration. These relate to opportunities available for creativity and adaptability in the existing framework, the lack of an overall 'vision', issues of data availability and citizen participation.

Table 2  
Comparison of ICM practice in India and ICM core process

Core design	India status
<i>Objectives</i>	
Economic efficient development to improve quality of life	Yes. Similar objectives identified in the ninth five-year plan (1997–2002) by the Planning Commission of India
Environmentally sustainable development that preserves the quality of the environment	
Socially equitable development that provides intersociety and intergenerational equity	
<i>Principles</i>	
Principle of careful decision-making	No
Precautionary principle	No
User pays principle	No evidence
Principle of public participation	Negligible
Principle of public access to information	Negligible
Principle of best available technology	No evidence
Principle of best environmental practice	EIA based
Principle of ecological integrity	Partly. No enforcement mechanism
<i>Initiatives</i>	
Taking a long-term view	Independent projects with no overarching strategy
Adopting a process of adaptive management	Regulatory management
Organising around an integrated approach	Sectoral approach
Promoting participation and a collaborative culture	Lack of public participation
Establishing coastal forums	Panchayat system
Developing understanding through multi-disciplinary training	Initiated
Highlight best practice	Nil
Determine indicators to measure the objectives	Nil
Establish conflict resolution mechanisms	Nil
Undertake Strategic Impact Assessment	EIA based
Conduct interdisciplinary research	Single discipline research
Establish a geographic information System	Initiated
Provide an information technology network	Negligible

### 3.3.1. Creativity and adaptability

Creativity and adaptability may be assessed by a brief examination of the procedure pursued following a decision taken by the Chief Minister of a State. The file containing the Chief Minister's decision is first seen by the Deputy Chief Minister, after which it commences its journey through the State Secretariat. The file reaches the Chief Secretary who in turn sends it to the Additional Secretary's office of the concerned department. From there, the file threads its way to the office of the Joint Secretary who forwards it to the Deputy Secretary of the department, who, in

turn, passes it to an Under Secretary who sends it to the Assistant (class III). The Assistant in turn prepares the draft note authorising the action [46]. Presumably, the draft note traces the same path back to the Chief Minister for action. Given the dynamic and complex situation of the coastal and marine area, such a procedure is likely to restrict local creativity and adaptability.

### 3.3.2. *Lack of 'vision'*

A lack of vision concerning the planning of coastal and marine areas, largely based on limited understanding of coastal processes, was identified through the interviews. According to one respondent, the development of Ennore Port and a thermal power station in Tamil Nadu State without adequate understanding of the coastal processes led to detrimental impacts on Pulicat Lake. Another respondent supported this general criticism, describing infrastructure development as being based on project specific EIA without taking into consideration the cumulative impacts of different projects on a region. It was suggested that there is a need to develop State development plans that integrate into an overall national development plan for the coastal and marine area [44].

### 3.3.3. *Data availability*

The lack of adequate data and poor data quality were identified as another drawback in the current management process [47]. Project development is viewed in an isolated manner where the cost–benefit analysis only looks at economic gains [48]. Scientific research and data are not made available to end-users. One respondent noted that not only is there a need to integrate science and management, but also to avoid overlapping work programmes and to promote data sharing between agencies.

### 3.3.4. *Citizen participation*

The 'top-down' approach in planning and implementation has led to the formulation of schemes without an assessment of the needs of local people [28]. However, there is evidence that voluntary organisations, co-operatives, corporate sector and government agencies have designed and implemented successful development programmes through citizen participation [28]. An example is the development plan in Kerala, which was steered by the People's Plan Campaign through the three-tier Panchayat system [49]. As part of this scheme, the State government devolved 40% of the plan funds to local bodies. Other success factors identified by the Planning Commission were meticulous planning, social leadership, external technological and managerial inputs, a holistic approach, availability of resources and continuous monitoring of progress towards implementation [28]. It emerged that agencies and activists involved in the development process, that initially focussed on a single activity, soon realised that a multi-pronged strategy was needed for both social mobilisation and to ensure the sustainability of the development process [28].

The Planning Commission, in calling for suitable institutional reform, has suggested the involvement of non-governmental organisations and the participation of citizens at grass roots level in the formulation, prioritisation, implementation and

monitoring of future programmes [28]. The essential components of institutional reform identified were: the assessment of local resources and local level planning; sensitising people and building local organisations for collective actions; and an umbrella support mechanism to facilitate people's development actions [28]. According to the Planning Commission, this requires a major political commitment to create the political space and policy framework for a sensitive support mechanism [28].

### 3.4. *Towards ICM*

An international workshop on 'Strategy for Sustainable Development in the Coastal Area' sponsored by United Nations Development Programme and the British Council, held in November 1999, concluded that India should implement ICM in a phased manner. It was suggested that this could be initiated through the production of sediment cell-based shoreline management plans [43]. However, it has been opined that in a soft democracy like India, ICM cannot work. A key question is how to involve the Union, State, voluntary organisations, people, corporate sector, academics and scientists in a single management process? One option is to concur with the observation of one respondent, that in a soft democracy like India, the 'bottom-up' approach cannot work given the Indian psyche to rely on the government. An alternative option, according to another respondent, is to recognise that without public participation, sustainable development is not possible and therefore the government should use active persuasion to encourage citizen participation. In the view of a further respondent, there is a need for an informed and empowered community, which requires public awakening through education and the creation of a representative management framework. This would require adequate resources and support from those in government. Most respondents considered the transparent integration of science and management at the local level to be at the cutting edge of management. Adapting the Pressure-State-Response model; the current situation in India is given in Fig. 7.

This section has established that ICM is viewed as possible by practitioners, but is, at present, in its infancy in India. Suggestions for a suitable organisational framework to deliver ICM aspirations varied amongst respondents from the formation of a single agency integrated from the local level to the national level, to the development of a co-ordinating mechanism with legal and executive powers. Only three of the nine respondents have conclusively agreed that co-management can deliver ICM in India. An analysis of the respondent's views is given in Table 3.

## 4. **The application of the generic institutional framework to India**

A central gap identified in previous research is that ICM strategy development has not been considered in the context of proven organisational models of private sector management [50]. Within such a theoretical context, there are a limited number of feasible institutional strategies and structures that can deliver ICM within a given

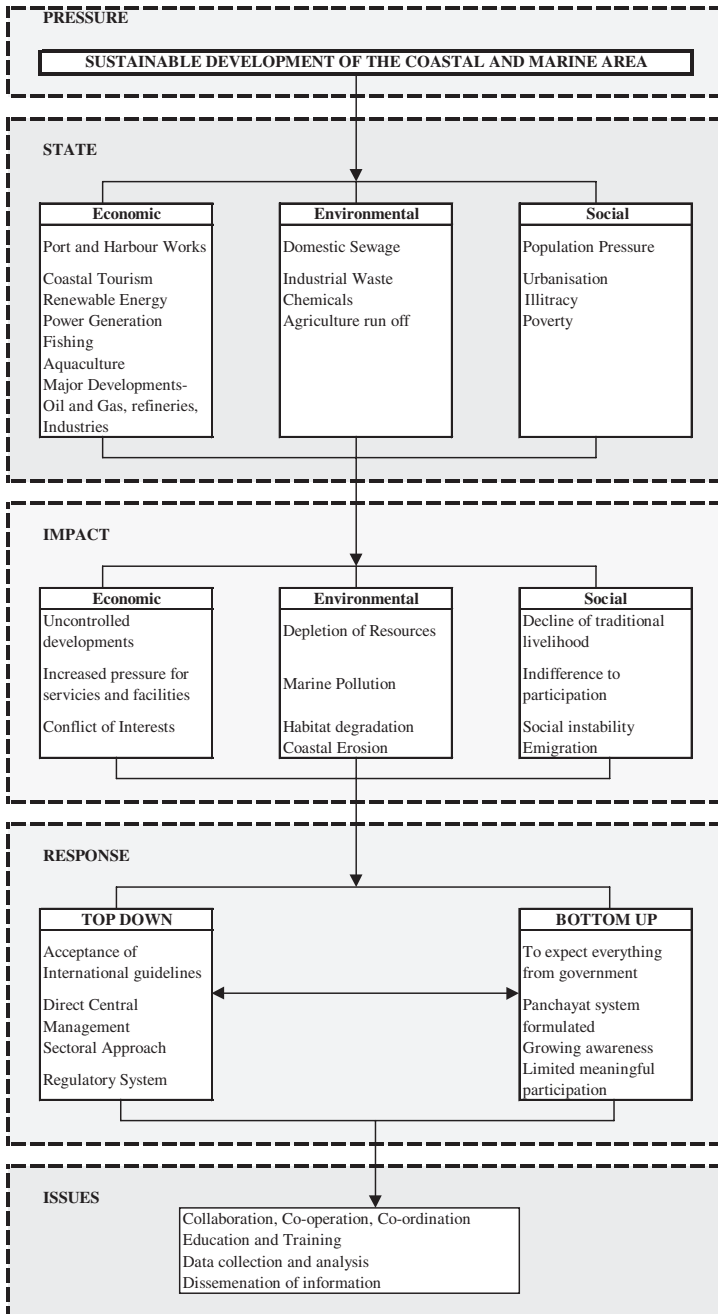


Fig. 7. Current ICM practice in India.

Table 3  
Analysis of the interviews

Interviewee	Item 1	Item 3	Item 4	Item 2	Item 5	Item 6	Score
Respondent 1	Yes	Yes	Yes	Yes	Yes	Yes	6
Respondent 2	Yes	Yes	Yes	Yes	Yes	Yes	6
Respondent 3	Yes	Yes	Yes	Yes	Yes	Yes	6
Respondent 4	Yes	Yes	Yes	Yes	Yes	—	5
Respondent 5	Yes	Yes	Yes	Yes	Yes	—	5
Respondent 6	Yes	Yes	Yes	Yes	—	—	4
Respondent 7	Yes	Yes	Yes	Yes	—	—	4
Respondent 8	Yes	Yes	Yes	—	Yes	—	4
Respondent 9	Yes	Yes	Yes	—	—	—	3

Item 1—current coastal and marine area management practice is sectoral in nature.

Item 2—current coastal and marine policy formulation is based on a centralised statutory approach.

Item 3—current management practice is detrimental to sustainable development of the coastal and marine area.

Item 4—a more co-ordinated, co-operative and collective approach to coastal and marine area management is needed.

Item 5—application of ICMAM will be step towards a more collaborative, co-operative and co-ordinated approach to coastal and marine area management.

Item 6—a framework based on top-down direction setting and bottom-up issue identification and resolution can deliver ICMAM in India.

setting. This section of the paper develops a generic organisational framework for ICM based on the ICM core process and established organisational management models. The framework is then applied to the specific context of India, and particular organisational actions are identified to facilitate the transition from ICM concept to practice in India.

#### 4.1. The bureaucratic organisation

The conventional response to coastal and marine issues, primarily based on the production of new regulatory and management-oriented actions, has failed to reflect the complex and dynamic environment in which organisations operate. In general, ICM strategy adopts standard legal and administrative approaches, but the typical institutional framework differs from the line-agency (sectorally oriented) type of organisation [2] or the professional bureaucratic organisation [51]. For ICM strategy to be successful, it needs to be conducted within a clearly defined institutional framework with an articulated vision for sustainable development. The only way to change a customary mode of operation, which is sufficiently embedded, is almost certainly to attack unilaterally both its structure and ideology [52]. ICM requires a shift in ideology to a more decentralised approach to management, in which

decision-making power is diffused away from a bureaucratic centre. Internalising the ICM strategy and adopting it as a deliberate strategy may be seen as dependent on:

- (a) Establishing a ‘language of change’, that all stakeholders can speak and understand [14].
- (b) Establishing a management framework capable of adapting to the dynamic macro-environment and continually changing socio-cultural situation [53].
- (c) A flexible planning system consisting of education and research components which cut across scientific disciplines [54].

India’s present bureaucratic system of government can be compared to Mintzberg’s [55] professional bureaucratic organisation (as shown in Fig. 8). The strategic apex (Prime Minister), middle line (Cabinet) and the flat operating core (government ministries/departments) are typically connected through a single chain of formal authority. The technostructure (research and development, scientific and academic institutions) and the supporting staff (administrative staff) influence the operating core indirectly. As the professionals work independently, the size of the ministries/departments (operating core) is very large, with a correspondingly large administrative staff (supporting staff). The institutional framework comprises a tall authority structure (the political system superimposed on the bureaucratic structure) with multiple reporting levels and a decision-making apparatus that concentrates authority near the top [14]. The structure that emerges is highly decentralised horizontally (in which Ministry professionals make decisions, which are then ‘signed off’ by their managers) with both operating and strategic flows passing down the hierarchy to the professionals of the ministries/departments (operating core). The three essential issues associated with the professional bureaucratic organisation are lack of co-ordination, discretion and innovation [51]. Consequently, the professional

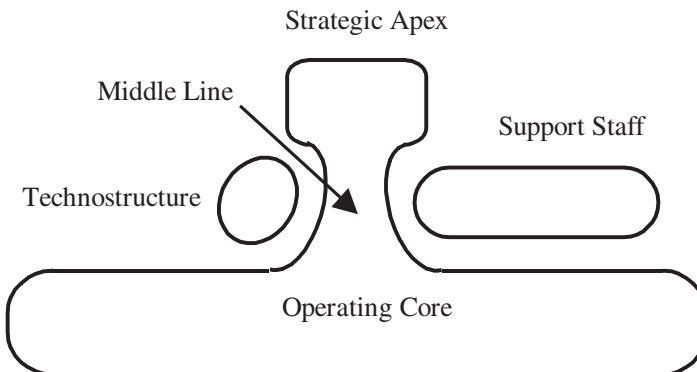


Fig. 8. The professional bureaucratic organisation. Source: Mintzberg [55].

bureaucratic organisation in India has inherent shortcomings in meeting the needs of the coastal and marine area that include [14]:

- (a) Internal focus on functional goals rather than an outward looking concentration on achieving sustainability of the coastal and marine area.
- (b) Loss of important information as knowledge travels up and down the multiple levels and across the sectoral departments.
- (c) Fragmentation of performance objectives brought about by a multitude of distinct and fragmented sectoral goals.
- (d) Added expense involved in co-ordinating the overly fragmented work and departments at times leading to duplication of effort.
- (e) Stifling of initiative and creativity at the community level.

Progress towards sustainable development of the coastal and marine areas will require the concerted efforts of each jurisdictional level—central, state and local [55]. An integrated approach, where management responsibilities are invested primarily in one agency (lead agency) or jurisdiction, is not different from the existing ‘top-down’ approach. Besides, in a Federal structure of government, as in the United States and India, a single lead agency is not feasible politically, and probably an undesirable concept [56]. Each jurisdictional level of government has a special interest and contribution to make to coastal and marine area management. For example, the national effort should include protection and management of the coastal and marine area as its primary goal. State efforts, at a minimum, should include establishment of coastal and marine development and planning standards. Finally, local efforts should ensure a sustainable community plan for each coastal locality [56].

An ICM institutional framework has to allow for power sharing and decentralisation of authority [2]. Both international and national experts recommend a collaborative, co-operative and co-ordinated approach accommodated within the governmental framework. Drawing on the ASEAN initiative an ICM strategy can run into difficulties if developed outside the governmental framework [17]. Even under the participatory approach of community-based management, or co-management, the government is required to provide necessary supervision and technical assistance besides devolving management authority to the concerned community [17]. As such, the government is the primary steward of coastal and marine areas and has the necessary governing tradition and financial resources [2]. Importantly, the Central government typically also has the most jurisdictions over coastal and marine waters. Furthermore, in the coastal and marine area, the capacity for rapid adaptation to the dynamic environment is essential. The existing professional bureaucratic organisation cannot therefore deliver an ICM strategy that requires the concerted efforts of all the stakeholders.

#### 4.2. *The innovative organisation*

An alternative approach is to adopt a strategy of innovative differentiation [57]. The innovation context is one in which the organisation must deal with complex

systems under conditions of dynamic change [57]. The ICM strategy can thus be viewed as akin to Miller's [56] innovative differentiation strategy. In pursuing the theme that there are ties that unite strategy and structure, Mintzberg's [55] 'innovative organisation' appears as a possible match for the implementation of ICM strategy. Using Mintzberg [55] and Miller [56], the strategy–structure relationship (as shown in Table 4) is examined in more detail.

Just as for the private sector, such a framework is suited for a given complex environment which is continually dynamic. The organisation should not focus too broadly or too narrowly in defining the market, which in the present context represents the geographic scope of the coastal and marine area. The structure is flexible and allows for the collaboration of necessary specialists. A high degree of differentiation prevails as people with different skills, goals and time horizons work together. Power is decentralised, as much of it would reside at the local level, supported by the technocrats and scientists responsible for issue identification, monitoring and evaluation. Authority is thus situational, based on the prevailing management issue and the related expertise available. Confining bureaucratic rules or standard procedures would become obsolete, as the framework would allow for the process of continuous learning and adaptation to the dynamic environment.

The information gathering systems developed for the analysis of the environment would allow frequent and open vertical and horizontal communications. These information and scanning systems would also enable all stakeholders to be aware of scientific and competitive developments within the defined coastal and marine area. The fundamental principles of the innovative organisation are [14]:

- (a) Organisation around cross-sectoral core processes, not individual activities.
- (b) Installation of process managers who will take responsibility for the core process in its entirety.
- (c) Making teams not individuals the cornerstone of organisational design and performance.
- (d) Decentralisation of power.
- (e) Integration with the community.
- (f) Empowerment of people by giving them the tools, skills, motivation and authority to make decisions essential to the team's performance.
- (g) Use of information technology to help people reach the objectives of sustainable development.
- (h) Establishment of indicators to measure performance.
- (i) Capacity building.
- (j) Development of a culture that focuses on continuous performance improvement through openness, co-ordination, co-operation and collaboration.

The basic institutional framework based on the innovative organisation (as shown in Fig. 9) includes a strategic apex (Prime Minister and Cabinet), administrative component (ministries/departments and administrative staff) and the new operating core (scientific and academic institutions and local bodies). Together, they avoid the trappings of the professional bureaucratic organisation, notably sharp divisions of

Table 4  
Organisational structure and strategy fits

Structural dimension	Entrepreneurial organisation	Machine organisation	Innovative organisation	Diversified organisation
Power centralisation	All at the top	CEO and designers of workflow	Scientists, technocrats and middle managers	Divisional executives
Bureaucratisation	Low informal	Many formal rules, policies and procedures	Organic	Bureaucratic
Specialisation	Low	Extensive	Extensive	Extensive
Differentiation	Minimal	Moderate	Very high	High
Competition	Extreme	High	Moderate	Varies
Dynamism/uncertainty	Moderate	Very low	Very high	Varies
Growth	Varies	Slow	Rapid	Varies
Information systems	Crude, informal	Cost controls and budget	Informal scanning, open communications	Management information systems and profit centres
Integration and co-ordination of effort	By CEO via direct supervision	By technocrat via formal procedures	By integrating personnel, task forces via mutual adjustment	By formal committees via plans and budgets
<i>Favoured Strategy</i>	<i>Niche differentiation</i>	<i>Cost leadership</i>	<i>Innovative differentiation</i>	<i>Conglomeration</i>

Source: [57].

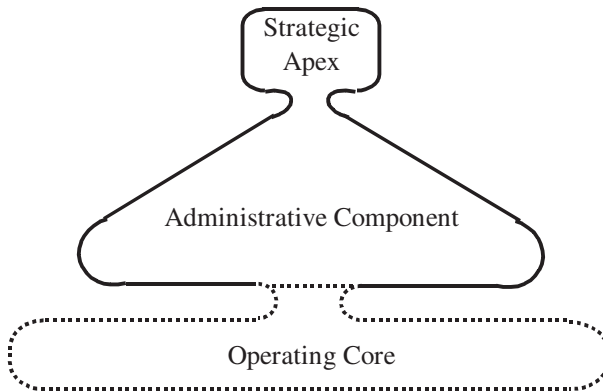


Fig. 9. The innovative organisation. Source: Mintzberg [55].

labour, extensive unit differentiation, highly formalised behaviours, and an emphasis on planning and control systems [51]. Using Mintzberg [55], the innovative institutional framework allows existing knowledge and skills (professionals in ministries/departments) to be treated as bases upon which to combine and build new ones (scientific, academic and local). Issues are assigned not to individual experts in independent disciplines, but to multi-disciplinary teams in the operating core. Each team forms around a site-specific project. Power over decisions and actions is decentralised to various places and at various levels according to the needs of the particular issue. The administrative component and the operating core tend to blend into a single effort. Over the long term, the administrative component becomes the facilitator for the operating core. The existing ministries/departments and administrative staff of the professional bureaucratic organisation emerge as an organic mass of line managers and staff experts (administrative component), combined with scientific, academic and local experts (operating core) that work together in a complex and dynamic environment on site-specific projects. Meanwhile, the strategic apex should manage work patterns by seeking partial control over strategies that emerge lower down. The strategic apex thus manages the process of strategy making, through the definition of process and strategy boundaries.

Within this model, strategic plan formulation for any given site occurs within the operating core and should be based on a learning model. It then moves up to the administrative component based on a planning model and is given direction at the strategic apex based on a visionary model. The strategic plan can then be adopted, funded, and put into operation by the administrative component. The operating core undertakes continuous monitoring and evaluation, and thus is able to assess the impact and provide feedback for corrective action to the administrative component. The environment takes precedence and drives the innovative institutional framework that responds continuously through a process of learning and adapting to the

dynamic situation. The innovative institutional framework achieves focus on the strategic theme of ICM through the mutual adjustment of all its actors.

#### 4.3. *A co-ordinating mechanism*

Three issues require attention before an ICM institutional framework can be developed [51]: ambiguity, inefficiency and inappropriate transition. Ambiguity in job definitions, authority relationships, and lines of communication can result in a rather politicised and ruthless organisation that is supportive of the existing power bases. The root of inefficiency is the cost of communication. Communication is key in the innovative organisation, since shared knowledge is used to develop new strategic plans. Despite this, it can still be a lengthy process before a decision finally emerges. A solution to the problems of ambiguity and inefficiency is to return to a more stable bureaucratic form of organisation. However, this carries an inherent risk of a return to bureaucratisation. The innovative institutional framework is suggested in order to address coastal and marine area issues imaginatively. To avoid ambiguity, inefficiency and the resultant danger of an inappropriate transition that forces a return to the bureaucratic system of management, there is a need to link the strategic apex, administrative component and the operating core through a co-ordinating mechanism. The co-ordinating mechanism must be representative of all the stakeholders, and should [58]:

- (a) Avoid significant conflicts over major reorganisational initiatives (such as the creation of a new ministry). It will seek an incremental approach to developing the operating core while retaining the existing professional organisation as the administrative component in the new organisation.
- (b) Allow narrowly focussed sectoral planning to be broadened in scope by taking account of interactions and interdependencies.
- (c) Enable the involvement of all agencies and interest groups concerned with the coastal and marine area and its activities.
- (d) Help develop an overall focus with defined national interests.
- (e) Ensure that the site-specific strategic plans are compatible with the local culture and socio-economic conditions.
- (f) Seek to develop both horizontal and vertical integration in planning, implementation, monitoring and evaluation.
- (g) Foster the capability to evaluate coastal and marine development projects from sectoral, cross-sectoral, local, state and national perspectives.

#### 4.4. *Application to India*

The application of the generic ICM institutional framework to India is based on several premises. First, coastal State governments should play a major role in coastal and marine area resource management because they have the administrative machinery, enforcement powers and constitutional authority on which to build a sound management plan. Second, each coastal State should develop programmes

around its own needs and objectives, subject to broad central government policy guidelines. Third, local level project teams are needed, initially for issue identification, and subsequent to project implementation, for monitoring and evaluation. Fourth, Central government support is needed to provide the policy, legal, financial and technical framework to sustain the initiative over long term. Fifth, the vast geographic scope of India’s coastal and marine area requires a national co-ordinating mechanism supported by a co-ordinating mechanism in each coastal State and Union territory. The innovative institutional framework based on these premises allows an ICM institutional framework to be suggested for India, as shown in Fig. 10. The suggested framework offers an opportunity to co-ordinate the State and local level planning, formulation, implementation, monitoring and evaluation necessary to achieve the overarching Central government strategy for the development of the coastal and marine area.

In suggesting an ICM institutional framework for India, there is a clear case for decentralisation of power. This is reflected in the Planning Commission’s strategy for the implementation of the ninth five-year plan (1997–2002). While a decentralised approach has much to offer in terms of addressing local needs and issues, the lack of co-ordination at the local, state and national level may over-ride the advantages of a decentralised approach [59]. Based on the strategy–structure relationship of Mintzberg’s [55] innovative organisation and Miller’s [56] innovative differentiation strategy, the suggested ICM institutional framework creates the formal links necessary for co-ordination between all levels of management. The approach provides a close relationship between the different organisational levels, with the highest policy level providing policy guidelines to the state and local planning levels.

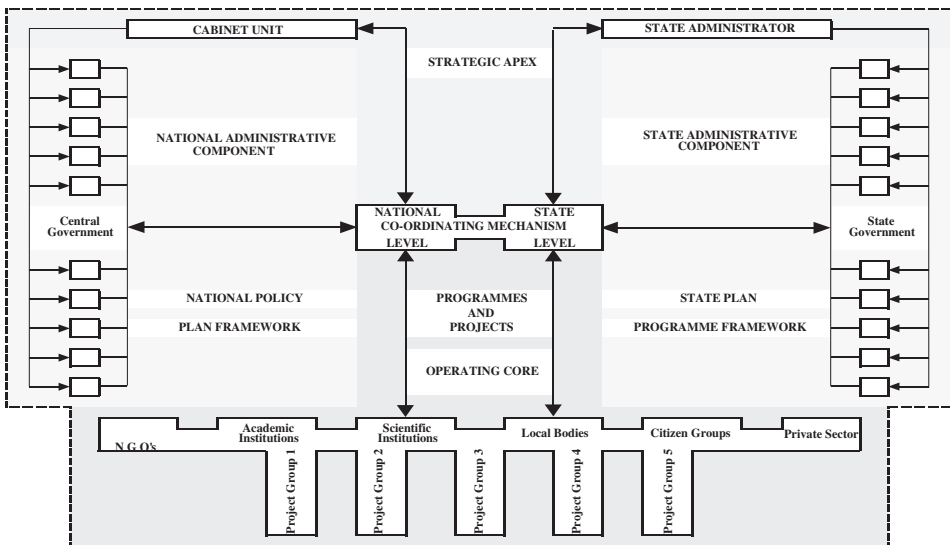


Fig. 10. Generic ICM framework for India.

Table 5  
Degree of integration

Management level	Geographic coverage	Degree of integration	Policy orientation
Local	Lowest	Highest	Lowest
State	Medium	Medium	Medium
Union	Highest	Lowest	Highest

The greatest degree of integration will be found at the local level, a lesser degree at the State planning level, and the least at the Union policy level as shown in Table 5.

In order to change the analytic perspectives of decision-makers (to take a long-term view based on co-management that facilitates a ‘top-down’ direction setting and ‘bottom-up’ issue identification approach), guidance from the highest level is required. Table 6 provides an interpretation of the suggested generic ICM institutional framework, and provides a reflection of the initiatives required to bring about the change suggested to the management of India’s coastal and marine area.

The proposed framework requires no structural realignment of the current bureaucratic system of government, instead it is absorbed within the administrative component of the suggested framework. There is no net loss of power or authority for any ministry or department. National and State Coastal Zone Management Authorities have already been constituted and can easily fulfil the role of co-ordinating mechanisms at the appropriate levels. With the ninth five-year plan (1997–2002), the process of selected decentralisation of power has already begun. A debate on the right to information has been initiated with the introduction of a bill in parliament.

Effective change in the institutional framework for the implementation of ICM cannot be achieved unless the impetus for change comes from the central institution itself. To proceed along the lines of the suggested framework, the following actions are needed:

- (a) Restructuring of the current National and State Coastal Zone Management Authorities to be truly representative of all stakeholders with an interest in the coastal and marine area.
- (b) Formulation of site-specific operating cores that links scientists, academics, non-governmental organisations, local bodies, citizen groups, and private sector.
- (c) Establishment of a coastal and marine area information and data networking system that brings data together into a central repository acting as a node for data dissemination and identification of gaps in knowledge.
- (d) Formation of a cabinet unit for coastal and marine affairs that oversees the effort of change. This is a difficult choice to make, but this visionary political commitment can provide leadership and courage for ICM to make the transition from concept to practice.

Table 6  
The ICM institutional framework initiatives for India

<b>TOP DOWN DIRECTION SETTING</b>	<p><b>STRATEGIC APEX OF THE ORGANISATION</b></p> <p>Change initiatives to be undertaken at the highest level</p> <div style="border: 1px solid black; padding: 5px;"> <p>Political Will Commitment Oversee quality of progress in the change effort</p> </div>
	<p><b>ADMINISTRATIVE COMPONENT OF THE ORGANISATION</b></p> <p>Change initiatives to be undertaken in Central government</p> <div style="border: 1px solid black; padding: 5px;"> <p>Establish a rational for change Form a cohesive high performance steering group Design a disciplined, integrated change process Open up bottle necks to change wherever they appear Take symbolic and visible action to demonstrate the required new behaviours and skills</p> <p>Establish a well honed communication and integrated measurement system that includes feedback loops and that cascades throughout the organisation Draw up tough but doable performance goals and hold people accountable for meeting them and also for meeting change commitments Foster continuous improvement by raising performance objectives</p> <p>Maintain the focus on sustainable development of the coastal and marine area</p> </div>
<b>BOTTOM UP ISSUE IDENTIFICATION</b>	<p><b>OPERATING CORE OF THE ORGANISATION</b></p> <p>Change initiatives to be undertaken at State, District and Local levels</p> <div style="border: 1px solid black; padding: 5px;"> <p>Redesign work units and levels to operate in an integrated fashion Establish project teams for issue identification, monitoring and evaluation Initiate interdisciplinary research Initiate multidisciplinary training Raise awareness through education Involve public in solution oriented workshops Involve the private sector, citizen groups and NGO's Introduce a wide array of tools to enable frontline problem solving and effective empowerment Actively engage in problem solving focussed on sustainable development of the coastal and marine area</p> </div>
	<p><b>THE ORGANISATION TRANSFORMATION</b></p> <p>Change initiatives to be undertaken across functions</p> <div style="border: 1px solid black; padding: 5px;"> <p>Set up redesign teams comprising multiple skills and functions Provide whole-job understanding through multidisciplinary team training Promote a culture of collaboration, co-operation and co-ordination Establish organisation-wide best practice workshops Establish cross-functional performance objectives Evaluate and reward co-operative cross-functional behaviours Design cross-organisational communication sessions Rotate jobs</p> </div>
<b>CROSS FUNCTION CORE PROCESS</b>	

## **5. Conclusion**

This paper has presented a proposed generic organisational framework to facilitate the transition from ICM concept to practice. The proposed framework has three distinct components: (1) a strategic apex based on a visionary model; (2) an administrative component based on a planning model; and (3) an operating core based on a learning model. These are connected by a co-ordinating mechanism that allows each component to function in unison. In essence, the strategic apex oversees the ICM core process, which is administered and operated through top-down direction setting and bottom-up issue identification and conflict resolution. The operating core continuously defines the concept that is adapted by the administrative component. The administrative component, in turn, oversees the implementation and operation through a process of dynamic practice. Based on 'learning by doing', the operating core facilitates the transition from concept to practice over the long term. These general structures, when applied to the specific context of individual nations, allow the determination of specific actions required to initiate the transition from ICM concept to practice.

The suggested generic framework has enabled a specific institutional framework to be suggested for India, accompanied by specific recommended operational actions. The recommended actions build upon existing institutional structures and therefore present a feasible evolution from the current institutional framework. It should be realised, however, that the actions, and ultimately the success of the recommended framework, rely on the presence of political will for a new approach to resource planning at all levels of governance. In India, high-level support has been provided by the Prime Minister of India, who, in the capacity as Chairman of the Planning Commission of India for the ninth five-year plan, stated that "the conditions that exist today demand a decisive break from the past". This paper has suggested an institutional framework to facilitate that 'decisive break', which has the potential to provide for the sustainable management of India's coastal and marine areas.

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*Note:* We hereby declare that the view reflected in this paper is completely our own view and in no way reflects the view of the Indian Navy or the Government of India.

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