

Ecosystem Approach based Methodology to Support Land use Planning: Egyptian Experience

Ghoneim SA^{1*} and Ibrahim H²

¹Department of Environmental Planning, Cairo University, Egypt

²Regional Development Department, Cairo University, Egypt

Abstract

This paper is focused on the Ecosystem Approach Framework for Planning and Management of Coastal Wetlands "EA-PMCW", as one of the novel Ecosystem Approach's customized frameworks. The EA-PMCW was developed by Ghoneim SA to support the land use planning and development decision in coastal wetlands as an example of the most sensitive and productive ecosystems on earth. However it translated the principles of the ecosystem approach into a step by step methodology considering the requirements of the planning process, it reflected the especial features of coastal wetlands and the challenges they are facing, including development pressures and increased impacts of climate change. The paper aims to test the applicability of the EA-PMCW within the context of the Egypt, as a rich representative case study. It starts with a brief description of the EA-PMCW and its main feature. Then it tests the applicability through exploring the potentials and challenges involved in applying different stages of the EA-PMW in Egypt. The results show high level of acceptability from the decision-makers and a promising level of applicability. Finally, some recommendations towards successful application could be extracted based on tackling the challenges and maximizes the potentials within the local context.

Keywords: Ecosystem approach; Coastal wetlands; Developing countries; Egypt

Introduction

The Ecosystem Approach Framework for Planning and Management of Coastal Wetlands 'EA-PMCW' was developed by Ghoneim [1], mainly based on developing the principles of the Ecosystem Approach 'EA' into a methodological framework. It aims to support land-use planning process and achieve sustainable development in coastal wetlands, as one of the most sensitive and productive natural ecosystems on earth. It should be mentioned here that the EA-PMCW was mainly learned from and built within four wider frameworks: 1. RAMSAR convention for wetlands [2-6]; 2. The Millennium Ecosystem Assessment [6]; 3. The principles and guidelines of the ICZM [7-9] and 4. The International Convention for Biodiversity. However, it is oriented to support the environmental land use planning process [9,10]. The EA-PMCW transferred the principles of the Ecosystem Approach 'EA' into a methodological framework, which integrates the distinguished features of the Watershed Approach and other suitable environmental planning approaches. It is also informed by the review of international planning and management experiences of EA applications and related frameworks and practical experiences, from the other EA customized frameworks. In order to test the applicability of this framework; the research used semi-structured interviews with the interested local experts. Moreover exploring the expected potentials and challenges could face the applicability of the EA-PMCW, a focus group workshop with the environmental managers and stakeholders helped to form some suitable recommendations for successful applications in Egypt.

The IUCN-CEM has been involved with the CBD since its drafting and through its further development, so it can be considered as one of the main supporters of EA and has sponsored and managed many EA-based projects all over the world (William 2000). IUCN-CEM has evaluated this history of EA applications according to five case studies (i.e. Niger/Nigeria, Mekong Delta, Congo, Panama, Indonesian Papua) representing different ecosystems with multidimensional issues. This evaluation highlighted some gaps to be covered in the EA to promote

successful application, including [11]: The principles do not focus on how ecosystems, and the biodiversity within them, actually contribute to and affect livelihoods. There is some indirect consideration of economic benefits for local people, but issues related to livelihood security and the resilience of the ecosystem so that it can continue to produce fundamental goods and services, are not an explicit part of EA thinking; Institutions are hardly mentioned except for managers: the normal structure of various ministries with local responsibility for land-use planning and means they are not used to considering ecosystems as units of management; The EA needs to be seen as useful by several groups of national-level policy makers, who set the strategy; provincial/sub-regional agencies who adapt national to local conditions; and district and local-level officials who implement policy and who have been the main focus of these case studies. Several authors have critically analyzed the practical experience of applying EA to marine environmental planning and management. The main barriers and the key development issues in these applications in marine planning and management have been summarized, as follows [12]:

- Ineffective stakeholder participation in planning and management.
- The lack of capacity for decentralized and integrated management.
- The overriding influence of perverse incentives.
- Conflicting political priorities.

***Corresponding author:** Ghoneim SA, Faculty of Regional and Urban Planning, Department of Environmental Planning, Cairo University, Egypt, Tel: +201000890056; E-mail: h1_sadeldin@yahoo.com

Received May 07, 2016; **Accepted** June 28, 2016; **Published** June 30, 2016

Citation: Ghoneim SA, Ibrahim H (2016) Ecosystem Approach based Methodology to Support Land use Planning: Egyptian Experience. J Marine Sci Res Dev 6: 201. doi:10.4172/2155-9910.1000201

Copyright: © 2016 Ghoneim SA, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Objectives and Main Features of the EA-PMCW

The main features of the EA-PMCW are summarized in Figure 1.

Dynamic

The proposed framework should be dynamic/ adaptive to reflect the continuous changes of the ecosystem.

Respecting the natural boundaries of the ecosystem

The unity of the ecosystem and flow of its natural functions should be maintained to achieve sustainability.

Multi-temporal (Long-term and Short-term)

To achieve suitability in the long term and to respond to short term challenges and needs, the framework should include different time scales of plans and ensure that the short-term managements plans are well fitting within the long-term plans.

Multi-spatial scales (local, regional, and global)

Applying the MEA's conceptual framework especially coastal wetlands play vital roles on different scales; the proposed framework should consider the development objectives and effects on these scales.

Multi-dimensional (Ecological, Social, Economic...)

However the environmental dimension should be at the core of

interest to preserve highly sensitive ecosystems, the human wellbeing as an integral part of this ecosystem should be considered as the aim of sustainable development.

Balanced

Top-down and bottom-up: Consider both human and natural aspects of the ecosystem, the local communities should be an effective partner in the planning and development process, especially to overcome most of downsides and problems of the current development.

Supported by effective ES assessment tool

An effective ecosystem services/values assessment tool is required to support the planning and management process and enable well informed communication between science and decision making.

Flexible

To respond to complexity and uncertainty associated with this very dynamic ecosystem, the proposed framework should be flexible enough. Also, flexibility is required for wider applicability of this framework within different local contexts of coastal wetlands including; social, cultural, institutional, and data characteristics.

Moreover applying the 12 principles of the Ecosystem Approach, The EA-PMCW's objectives were formed to precisely reflect the

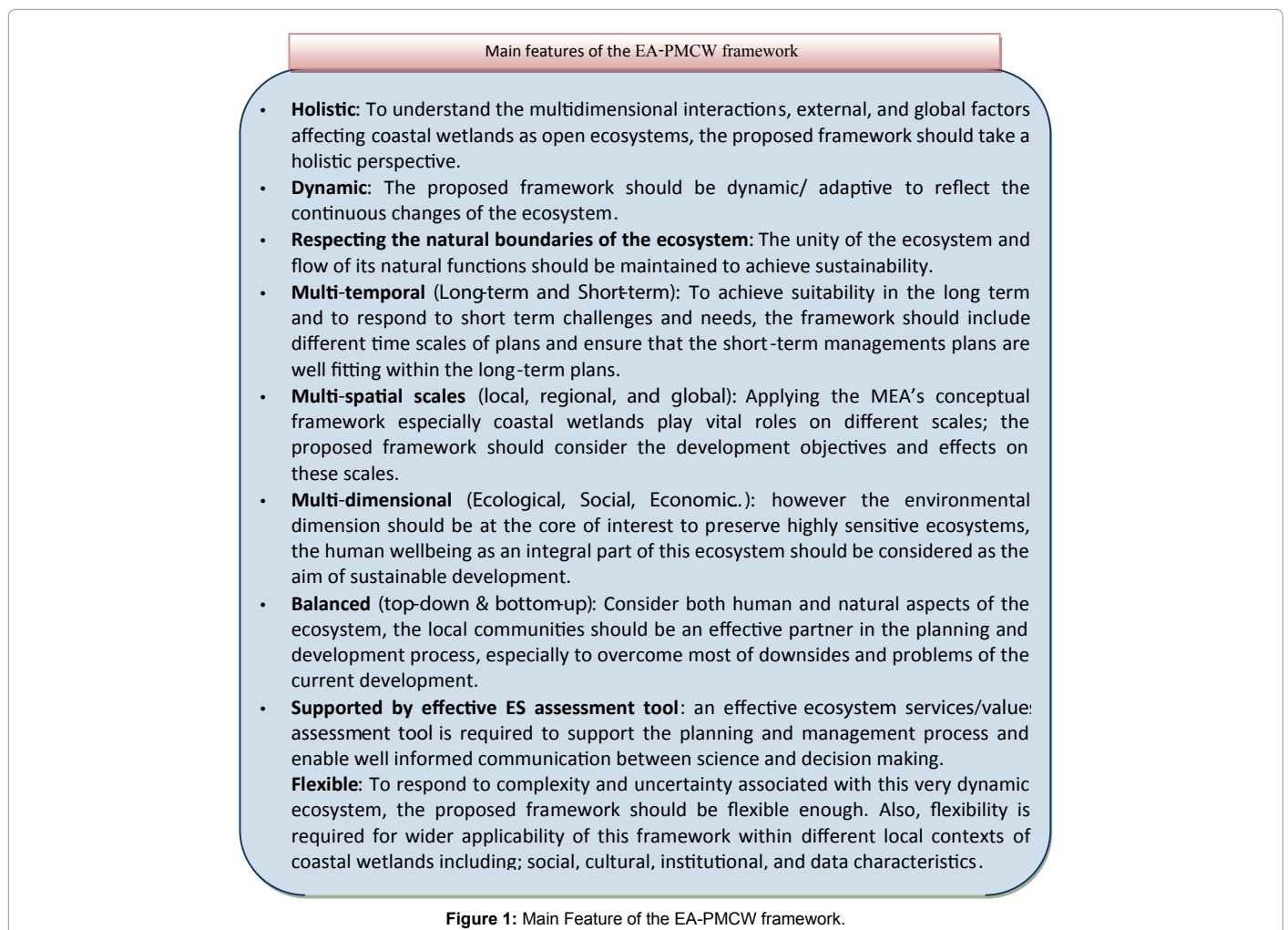


Figure 1: Main Feature of the EA-PMCW framework.

especial features of coastal wetlands, the challenges they are facing, and the main requirements of land use planning process, as follows [1]:

- Maintain/sustain biodiversity and ecosystem services for the long term.
- Protect the rare, unique, threatened species and their habitats.
- Protect the human cultural features as an integrated part of the ecosystem.
- Meet the local communities' objectives within the global national, and regional frameworks.
- Minimize impacts of human development.
- Minimize effects of global warming, sea level rise and other natural coastal hazards or expected extreme events.
- Respect the natural units.
- Ensure that environmental, social, and economic objectives are achieved at an acceptable cost to society.
- Enhance implementation through participatory planning, knowledge management and capacity building.
- Maintain continuity of effective planning–management process.

Stages and Steps of the EA-PMCW

This section briefly explains the main stages of the EA-PMCW framework [1]. The EA-PMCW can be divided into seven stages, which reflect a continuous nonlinear process, as it contains a few feedback loops for checking, updating, learning and adapting different proposals and actions of planning and management. Figure 2 illustrates these stages and their suggested steps, as follows [1]:

The pre-planning stage

This stage aims to determine the scale of the planning and management regime, and its essential requirements. It starts with looking at the coastal wetland area from global and national perspectives to obtain strategic reflections of these levels on the planning and management of this area. This stage includes:

- Identifying the class, level and scale of the coastal wetland.
- Identifying the external objectives and role within international, national, and regional strategies.
- Identifying financial resources.
- Identifying and preparing the institutional requirements.

The scoping stage

This stage aims to draw the direct and indirect boundaries of the planning and management regime. It is a multilevel stage which attempts to create a balance between the natural and the human aspects not only in the definition of spatial boundaries but also in the identification of the main issues of concern, goals, and the primary objectives.

The Analysis stage

This can be considered the most complex, multidisciplinary and critical stage of the process. It aims to combine the different current

and future characteristics of the coastal wetland, and to draw integrated pictures, which will form the base of decision making in the planning and management stage.

The planning stage

The aim of this stage is to develop effective and efficient land-use plans, management plans, and emergency plans, in order to achieve the agreed objectives, using the results of all previous steps.

The implementation stage

To ensure efficiency of implementation, a time frame and measurements of progress should be set within each of the plans. Then the institutional arrangements, and other required resources should be prepared because implementation phases and programmes are very case specific, so they are not discussed in details here.

The monitoring (not limited to this stage)

Details of monitoring programmes and activities are also case specific, but generally regular monitoring programmes should be established and the required human and technical resources should be ensured from the beginning. Situation analysis, taking suitable actions, and resolving conflicts is a continuous set of steps which should run throughout the whole framework and not just be limited to the end of the plan making cycle to meet the dynamic and sensitive nature of coastal wetlands. Responding to this dynamic nature, the database should be regularly updated with a simple kind of trend analysis, and a conclusion of the situation should be shared with partners and stakeholders. It should be mentioned here that a suitable action at this stage could be applying one of the emergency plans, whenever its related scenario happens.

The evaluation and adaptation stage

Evaluation and adaptation again is a multi-temporal process, which differs in details, techniques used and outputs, from one time frame to another.

The Case Study

Egypt enjoys a vital strategic location between three continents. This gives it a special significance from the point of view of biodiversity. The Egyptian coastline extends 3,500 kilometres along the Mediterranean Sea and Red Sea in addition to the Suez and Aqaba gulfs [8]. The coastlines of Egypt are rich with wetland ecosystems, such as: coral reefs, mangroves, sand dunes, sea grass beds, estuaries, and coastal forests. At the same time, the Egyptian coasts are amongst the most densely populated areas in the MENA region [13]. Although the Egyptian coastal wetlands have attracted wide variety of the economic activities, most of them require especial protection due to their internationally recognized biodiversity. Indeed, coastal wetlands are facing main environmental challenges, including increased impacts of climate change all-over the world, they are under intensive pressure in Egypt [14]. This has caused water pollution, huge deterioration of their natural resources, and increased shoreline erosion. The socio-economic context of Egypt as a developing country has put extra pressures of development and impacts of unplanned activities on its coastal wetland [15]. Moreover some negative changes naturally driven by their location, including land subsidence along the northern coast due to the tectonic movement, which increases the effects of sea level rise. From here, the Egyptian case was selected as a rich case study for testing applicability of the EA-PMCW.

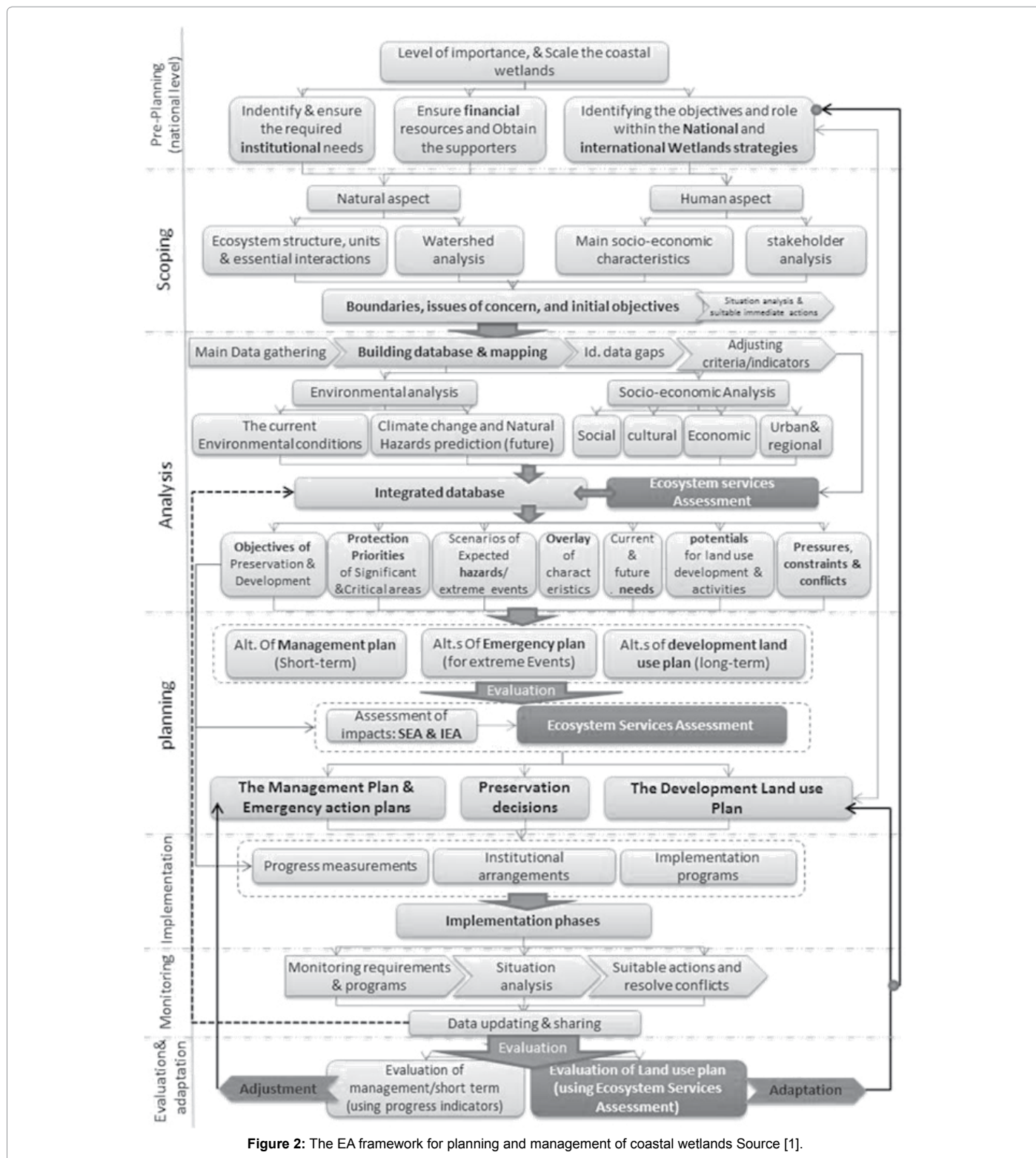


Figure 2: The EA framework for planning and management of coastal wetlands Source [1].

Overview the methods and techniques of data-collection

Several techniques of primary and secondary data collection were used here in order to increase accuracy and reliability of results. The Expert-Interviews and the Focus-Groups techniques were chosen as suitable empirical data-collection techniques for this research task [16].

The documentary data was used to build a suitable understanding of the local context of the case study (i.e. natural, social, economic, and institutional conditions). However the semi-structured interviews with the local experts mainly helped to test the applicability of the EA-PMCW (i.e. the expected potentials and challenges), the focus-groups

technique with stakeholders and environmental managers was helped to form solid recommendations for more successful applications of the EA-PMCW within the Egyptian case [17-22].

Focus on the results

The results show a great acceptance of the EA-PMCW to be applied within the Egyptian context, as 100% of the interviewees evaluated it as a comprehensive methodology which meets the local and international objectives in coastal wetlands. However, they almost agreed that a few adaptation guidelines should be considered in order to overcome the especial challenges, which may face its application in Egypt and other developing countries. In more detailed vision, the focus of the interviews turned to explore potentials and challenges of applying the eight stages of the EA-PMCW framework. Then, recommendations and guidelines for successful applications were formed. Figures 3 and 4 draw an overview of the potentials and challenges of applying the framework, as seen by the interviewees.

Main potentials

Several significant potentials for applying the suggested framework in the Egyptian context were mentioned by the interviewees, as illustrated in Figure 3. Most of them are related to human, academic, and technical resources. For example, Egypt is the pioneer of several disciplines in the region such as through unique Faculty of Urban and Regional Planning, in Cairo, the Authority of Remote Sensing and Space Science, the development of Arabic GIS software. Also it has the longest history and leadership of most of the needed scientific disciplines

in the region (e.g. The Institute of Oceanic Science, Water Research Institute). However concern about environmental issues comes in the second place of potentials in both levels of the government and in nongovernmental actions and they represent initial steps which need to be integrated and maximized. According to the stages of the suggested framework, the distribution of potentials tends to support most the planning stages, especially the scientific and technical potentials.

Main challenges

Figure 3 shows an overview of the challenges which may face application of the suggested EA-PMCW framework within the current local context, as mentioned by the Egyptian expert interviewees. Several weaknesses are related to integration and coordination of planning and management process, which are likely to significantly affect the second half of the process (e.g. planning, implementation, monitoring). Although technical challenges (e.g. data availability and quality, boundary determination) can affect the whole process, weakness of social participation and public awareness are also likely to be very significant throughout.

Extracted Recommendations

The previous section has explored the potentials and challenges of applying the EA-PMCW framework in Egypt as a case study and validated the findings of the interviews with the other available sources of evidence. This section presents some recommendations towards successful application based on tackling the challenges and maximizes the potentials within the local context. These recommendations have

Potentials	Pre-planning	Scoping	Analysis	Integrated Analysis	Planning	Implementation	Monitoring	Evaluation Adaptation
Active involvement with the international environmental movement	●	◐	◐	◑	◑	○	○	◑
Having a powerful central national environmental agency 'EEAA'	●	●	○	○	◐	◐	◐	◐
Specialized academic institutions supporting the required qualifications	●	●	●	●	●	◐	●	◐
The existing national movement towards applying principles of EA in sensitive areas	◐	◐	○	○	◐	○	◐	◐
Having a supportive National Strategy for wetlands	●	●	◐	◐	●	◐	◐	◐
Wide experience with the international environmental sponsors	◐	◐	○	○	◐	◐	◐	◐
The increased role of GIS in different institutions and levels of projects	○	◐	●	●	◐	◐	◐	●
Leading capabilities of remote sensing in the region	○	◐	◐	◐	◐	◐	◐	◐
Leading academic experience in environmental planning and physical planning in the region	◐	◐	●	◐	●	◐	◐	◐
The increased number and activities of social groups and NGOs interested in environment and sustainability	◐	◐	○	○	◐	◐	◐	◐
The increased social power and desire of participation in decision making	◐	●	○	○	◐	◐	◐	◐

Source: Author upon interviews with Egyptian experts

Frequency of the mentioned potentials by the interviewees

- the vast majority (>80%)
- ◐ around half of them (40-60%)
- ◑ the most of them (60-80%)
- ◒ few mentions (<40)

Figure 3: The EA framework for planning and management of coastal wetlands. Source [1].

Challenges	Pre-planning	Scoping	Analysis	Integrated Analysis	Planning	Implementation	Monitoring	Evaluation Adaptation
Insufficient integration between national institutions and local governance	○	◐	○	◐	◐	◐	●	●
Weak cross-sectoral links & lack of integration/communication between parties	◐	◐	◐	●	●	◐	◐	◐
Lack of Integration between disciplines/the boundaries of too narrowly focused disciplines	○	◐	◐	◐	◐	○	○	◐
Insufficient of monitoring and enforcement effort	○	○	○	○	○	●	●	○
Limited financial resources and insufficient equipment	●	○	◐	◐	◐	●	●	◐
Difficulty of identifying boundaries and units of management	○	●	◐	◐	◐	●	●	●
Weak participation of the local communities, stakeholders, and interest groups	○	◐	○	○	◐	◐	○	◐
Weak public awareness of environmental and sustainable issues	◐	○	○	○	○	◐	◐	◐

Source: upon interviews with Egyptian experts

Frequency of the mentioned challenges by the interviewees

- the vast majority (>80%) ◐ around half of them (40-60%)
- ◐ the most of them (60-80%) ○ few mentions (<40)

Figure 4: Challenges which may affect successful applications of the suggested EAPM-CW framework in Egypt.

been gained through focus groups sessions with the local experts and decision makers.

Coordination and leadership

Establishing leadership or identifying a coordinating agency was strongly recommended by the focus group, as a first step towards solving problems of lack of integration. There was a primary agreement that the main responsibility of this lead agency should be to facilitate and control the quality of the planning and management process vertically through the different levels and horizontally among different parties. Although a few other agencies were mentioned as alternatives to take this responsibility, the discussions concluded that the Egyptian Environmental Affairs Agency (EEAA) is the most recommended one because it has several advantages over the other bodies in this regards, including:

- It is already responsible for drawing the National Wetland Strategy.
- It has already played a significant role of integration on the regional and global levels (e.g. UNFCCC, RAMSAR).
- It is responsible for the main environmental data drivers in Egypt (e.g. biodiversity annual reports).
- It is the central national body responsible for evaluating EIA studies.
- It is responsible for Egypt’s sea and coastal zone policies, although different authorities also have different responsibilities in the coastal zones.
- It has a successful experience of managing protected areas, and it already has a network of local management units.
- The environmental law has given it higher authority in environmental related issues than any other governmental body.

Integration

weak integrations was identified as a main challenge facing the planning and management process in Egypt, so establishing a clear vision for integration was a key task and product of the focus group discussions. The suggested vision for effective integration can be illustrated as follows:

Vertical integration: A balanced relationship between top-down and bottom-up Integration between different levels of strategies and plans (i.e. local, regional, national, and global) was called for. The Egyptian Environmental Affairs Agency ‘EEAA’ already has valuable institutional units which can be linked and supported with the required capacity to play an effective role in integration between different levels of plans and strategies [15]. The EEAA is already coordinating the Wetlands Committee which draws the National Strategy of Wetlands, and at the same time it coordinates two ICZM committees for the Red Sea and the Mediterranean [8]. Moreover, the natural preservation sector in EEAA is managing all the preservation areas in Egypt and it has a local management and monitoring station in each one, including those in wetlands. Although currently all these committees and sections are located within and coordinated by the EEAA, an integration mechanism needs to be established and coordinated by EEAA. The existing units of EEAA can be used, after supporting them with the needed capacity, to manage the flow of information, guidelines, plans, and strategies vertically between different levels.

Horizontal integration on the national level: The research concluded that the EEAA has the capability to lead the integration between different development sectors and governmental agencies, and produce the final plan. On the other hand it was felt that the academic and scientific institutions should play very important role to support the EEAA and its committees and local units with the needed capacity of staff and physical capabilities as applicable. The suggested view of integration on the national level should be based on the role of EEAA

as the central coordinator between national institutions and the local level. However as data sharing and management is a fundamental part of the integration and coordination tasks of EEAA, strong connection with the national data drivers through the IDSC 'Information and Decision Support Centre' is required.

Horizontal integration on the local level 'the wetland': The research emphasized the importance of establishing a powerful local management unit/committee for each coastal wetland. This unit would be the coordinator/leader of the process on the local level and it should be well linked with its related main committee in the EEAA. However the flow of information, guidance, technical support and feedback should be active and dynamic between them and in two directions. Institutionally other local governmental bodies representing the development sector would integrate information and facilities with the wetland unit through the governorate. Two strong wings would support effectiveness of the process: a) The local community (e.g. social groups, stakeholders, NGOs); and b) scientific and technical support (e.g. academic and research centres).

Current management boundaries and natural units of ecosystems

Current boundaries of governments, under any classification are not suitable for planning and management of the coastal wetlands. As discussed before, no clear boundaries have been drawn for development or management except limited boundaries of preservation areas. A positive step in this regard, has been taken by the NARSS using remote sensing capabilities to help determine the boundaries of main features in the northern coastal wetlands including; water basins, fish farms, and salt farms. A common suggestion by the focus groups was to declare the final produced boundaries together with the suggested local management unit of each coastal wetland as a new legal and institutional framework of these areas.

Local communities and public participation

Public awareness of environmental issues and sustainable development is growing but efforts are needed to prepare the local communities and social groups for positive participation in development plans and activities. Workshops and training programs are recommended, as persuading them to be a responsible partner in the planning and management process to achieve balanced the sustainable development is essential. Several mechanisms can be used such as: giving the local communities advantages and facilities to own or benefit from the proposed projects, creating new job opportunities for them, encouraging them to participate in data collection and other planning and management by employing them as assistants in the task.

Conclusion

The EA-PMCW - developed by Ghoneim [1] - transferred the wide principles of the ecosystem approach into a clear, step by step methodological framework to support land use and development decision making. However its steps was designed to fit the requirements and main stages of the planning process, it carefully consider the especial features of coastal wetlands and the global challenges facing them. The primary test of applicability shows promising results and gave solid evidence of acceptability of the EA-PMCW; however several

points of consideration clearly formed to tackle the expected challenges, maximize the potentials, and achieve successful application within the local context of the Egyptian context.

References

1. Ghoneim SA (2012) An Ecosystem approach and an ecosystem service assessment technique for planning and management of coastal wetlands, PhD, University of Liverpool.
2. Ramsar (2016) Wetlands for our future: The 4th Strategic Plan 2016 - 2024, Adopted by the 12th Meeting of the Conference of the Parties at Punta del Este, Uruguay, 1-9 June 2015, through Resolution XII.2. Ramsar (Ramsar Convention Secretariat).
3. Ramsar (2010) Coastal management - Wetland issues in Integrated Coastal Zone Management, Gland, Switzerland, Ramsar Convention Secretariat.
4. Ramsar (2010) Managing wetlands, Gland, Switzerland, Ramsar Convention Secretariat.
5. Ramsar (2010) Wise use of wetlands: Concepts and approaches for the wise use of wetlands, Gland, Switzerland, Ramsar Convention Secretariat.
6. MEA (2005) Ecosystems and Human Well-Being: Wetlands and Water. In: Assessment Me (ed.) Washington. DC: World Resources Institute.
7. Ibrahim HS, Hegazy I (2014) Towards Applying Strategic Environmental Assessment (SEA) in the Egyptian Context. Asian Acad Research J of Social Sci and Humanities 21: 325-341.
8. Ibrahim HS, Ghoneim SA (2013) Integration as a significance factor in effective coastal management: Egypt as a case study. International Journal of Marine Science 46: 389-401.
9. Ehler C, Douvère F (2009) In: Dahl R (ed.) Marine Spatial Planning: a step-by-step approach toward ecosystem-based management, Paris UNESCO.
10. Randolph J (2004) Environmental land use planning and management, London, Washington, Island Press.
11. Shepherd G (2008) The Ecosystem Approach: Learning from Experience. Gland, Switzerland: IUCN p: 190.
12. Kidd S, Maltby E, Robinson L, Barker A, Lumb C (2011) The Ecosystem Approach to marine planning and management, London: Earthscan.
13. EEAA- Ministry of Environment (2016) Egyptian Biodiversity Strategy And Action Plan (2015 - 2030), UNDP, GEF, PIMS no: 4864.
14. El-raey M (2010) Egypt: Coastal Zone Development and Climate Change.
15. Ghoneim SA (2014) An Ecosystem approach for Planning and management of coastal wetlands, ECSEE 'The 2nd European Conference On Sustainability, Energy, And The Environment, Brighton, proceeding.
16. Bogner A, Littig B, Menz W (2009) Interviewing Experts, London: ECPR.
17. CBD (2016) About the Convention. Norway: Convention on Biological Diversity (CBD).
18. CBD-COP (2010) Strategic Plan For Biodiversity 2011-2020 and The Aichi Biodiversity Targets: Living in harmony with nature. In: DIVERSITY, COB (ed.) The Conference of the Parties Japan.
19. Gillespie AR, Miller BK, Johnson AKD (1995) Effects of Ground Cover on Tree Survival and Growth in Filter Strips of the Cornbelt Region of the Midwestern US, Texas A&M Blackland Research Center.
20. Ibrahim H (2013) Towards an effective framework for coastal zone management: the Egyptian experience. Journal of Coastal Conservation: Planning and Management 3: 601-613.
21. Kelly M, Tuxen K, Stralberg AD (2011) Mapping changes to vegetation pattern in a restoring wetland: Finding pattern metrics that are consistent across spatial scale and time. Ecological Indicators p: 11.
22. Maltby E (2009) The Changing Wetland Paradigm. In: Maltby E, Barker T (ed.) Wetlands Handbook. Blackwell Publishing Ltd.