Established in 2006, Kien Giang Biosphere Reserve (KGBR) boasts a very high biodiversity and typical forest ecosystems. The challenge for the Reserve and Provincial managers is to balance economic development with conservation. Eighty per cent of the land area is less than one meter above sea level and therefore under threat from climate change, mainly seal level rise and storm influence. A Biosphere Reserve Management Board (BRMB) was set up by Provincial People Committee (PPC) to advice provincial leaders on how to solve complex issues using integrated, cross sectoral management decisions. The use of cross sectoral planning is a new concept being encouraged by the Government of Vietnam.

A comprehensive capacity building program for key members of the BRMB has been underway for the past four years, with technical assistance from the “Conservation and Development of the Kien Giang Biosphere Reserve Project”, funded by AusAID and implemented by GIZ. This program has led to the implementation of several new and innovative management approaches that were developed through consultation with a wide range of stakeholders in KGBR. For example, (1) Provincial Integrated Coastal Management Plan for Climate Change Adaptation and Mitigation; and (2) Management plan to harmonize develop environmental protection for the unique, cultural and historical values of Dong Ho Lake.

**Keywords:** Vietnam, Biosphere Reserve Management, Cross Sectoral
1. Introduction

Kien Giang is a coastal province in the western part of the Mekong Delta. It is situated from 9° 23'50” to 10° 32'30” north and from 104° 40'00” to 105° 32'40” east. The province shares a border with Cambodia in the north, An Giang, Can Tho and Hau Giang provinces in the east and southeast, Ca Mau provinces in the south and Thailand gulf in the southwest.

The Kien Giang Biosphere Reserve (KGBR) was established in 2006 and encompasses much of the 200km coast line and adjacent marine areas of the Province as well as U Minh Thuong and Phu Quoc National Parks. The Biosphere Reserve (BR) covers 1,118,105ha of Kien Giang Province, with a 36,935ha core zone, 172,578ha as buffer zone, and 978,591ha transition zone. The BR seeks to foster the conservation of 22 habitats within tropical rainforests, limestone and karst forests, swamps, Melaleuca (M. cajuputi) forests, mangrove forests, sea grass beds, coral reefs, coastal wetlands, and seasonally flooded grasslands.

The KGBR has significant biodiversity with about 1,500 vascular plants, 77 mammals, 222 birds, 107 reptiles and amphibians (Kien Giang People Committee, & UNESCO Vietnam, 2005). Twenty species have been identified as having special conservation priority including the Round leaf Cycad.
(Cycas litoralis); Hairy-nosed Otter (*Lutra sumatrana*), Jungle Cat (*Felis chaus*), Fishing Cat (*Prionailurus viverrinus*), Large-spotted Civet (*Viverra megaspiila*), Indo chinese Silver Langur (*Trachypithecus germaini*), Lylei’s Fruit Bat (*Pteropus lylei*), Large Flying Fox (*Pteropus vampyrus*); Sarus Crane (*Grus antigone*), Indian Darter (*Anhinga melanogaster*), Lesser Adjutant (*Leptoptilos javanicus*), Great Hornbill (*Buceros bicornis*); Reticulated Python (*Python reticulatus*), King Cobra (*Ophiophagus hannah*), Yellow-headed Temple Turtle (*Heosemys annandalii*), Malayan Box Turtle (*Cuora amboinensis*), Snail-eating Turtle (*Malayemys subtrijuga*), Asiatic Softshell Turtle (*Amyda cartilaginea*); Green Sea Turtle (*Chelonia mydas*) and Hawksbill Sea Turtle (*Eresmochelys imbricata*).

Four forest types and plant communities have been identified as having special priority for conservation.

- Dwarf forest on sand hills in Phu Quoc Island
- Near mono-specific stand of Red-flowered Black mangrove (*Lumnitzera littoraea*) in the Rach Tram estuary of Phu Quoc Island. The trees are very large, 10 - 15 m tall with diameter 30 - 60 cm and up to 1 m. The species is listed as vulnerable in the Viet Nam Red Book of Endangered Species
- Melaleuca forest on peat land in U Minh Thuong National Park.
- Coastal mangrove forest.
- Coral reefs: 700 ha of coral with 87 species, nearly half are hard corals making up to 24% of the coral area. The corals occupy up to 40% of the reef areas. There are 12,000 ha of sea grass beds (10 species) which support the rare and endangered turtles and dugong. These are very important ecosystems for biodiversity but are also very important for tourism particularly on Phu Quoc Island.

2. Management challenges

- The overall challenge for the BRMB is to balance sustainable economic development with conservation of the environment and particularly its unique biodiversity.
- Lack of awareness: The BR concept is new to the provincial staff and local communities. Environmental awareness of the staff and local people is limited.
- Climate change and sea level rise: The studies undertaking by MRC (2011); (ADB, 2011), and the Ministry of Natural Resources and Environment (MONRE) show that Kien Giang is one of two most vulnerable provinces in Mekong delta to Climate Change and sea water rise. Most of the main land area in the province is a flat plain with an average elevation of 0.6 m-1.5 m above sea water level. If the sea water rises by 1 m, it is projected that approximately 75% of the Kien Giang main land will be inundated by 2100 (MONRE, 2012). As a result, large areas of crop-land, melaleuca, mangrove forest and other seasonally inundated wetlands will be affected.
- Change in land use: Current development and livelihood activities that support the provinces high economic growth expectations has resulted in a large area of forest being converted for infrastructural development and agricultural production. This leads to negative impacts to both terrestrial and wetland ecosystems.
- High population: A large population (354,000 people) is lives in the BR (Kien Giang People Committee, & UNESCO Vietnam, 2005) and these people rely on agriculture and aquaculture (fish, shrimp, crabs, clams) and the forest resources. Local incomes are low and illegal
extraction often creates negative impacts to the biodiversity and resources in the Biosphere reserve.

- Lack of integrated planning: The traditional approach of sectoral planning and management has led to the fragmentation and the degradation of important natural resources, particularly the protected coastal mangrove forest. As a result, the unique buffer vegetation along the coast has poor capacity for resilience and a limited ability to mitigate the effects of increasing surge storms and sea water level.
- Lack of law enforcement: Although there are appropriate laws, law enforcement is not well implemented. This has allowed the continuation of illegal wildlife trading, forest fires, deforestation, pollution from industrial development, tourism activities, land clearing and digging of canals for farming (Dang, 2009).

3. The Biosphere Reserve Management Board

June 21st, 2010, the Kien Giang Peoples Committee (PPC) enacted decision number 1335/QD-UBND to set up a Biosphere Reserve Management Board (BRMB) and Steering Committee following the model of the GIZ Project. The board is composed of representatives from the Provincial People Committee (chair of the management Board), Department of Science and Technology [DOST] as Vice (standing chair of the Board), Department of Agriculture and Rural Development (DARD), Department of Natural Resources and Environment (DONRE), Department of Finance (DOF), Department of Planning and Investment (DPI), Department of Culture, Sport and Tourism, National Parks, Forest Protection Management Boards, District Leaders, Mass media and Civil social organizations.

This management system allows cross-sectoral integrated planning on adaptation for climate change, conservation, and sustainable development for local communities, scientific research, education and training.

Study tours and attendance at conferences have proved to be two effective activities contributing to the theme of awareness raising about the BR management for provincial leaders. After setting up BRMB and with support from GIZ project, several study tours were organized to visit Noosa BR (Australia); Wadden Sea and Hallig Islands of Schleswig-Holstein BR (Germany); Rannong BR (Thailand); Cat Ba BR (Vietnam). The study tours provided provincial leaders with opportunities to learn from the experience of other biosphere reserves and facilitated opportunities for networking, and the exchange and sharing of information and management experience among the BR system nationally and internationally. Best management practice identified from the study tours and conferences were reported to the Chairman of PPC and recommended for adaption and implementation in the Kien Giang BR, for example (1) Noosa’s management experience in collaboration with University, research institutes to bring domestic and international students to come and study in the BR; and (2) Using brand name of the biosphere reserve for enterprises to boost green development and contribute to biodiversity conservation as the model of Cat Ba Biosphere Reserve (Vietnam).

The Kien Giang BRMB is now able to apply an integrated approach to planning and management of its natural resources, particularly in areas with conflicts and overlap of management roles that involve many agencies, for examples:

3.1. Integrated coastal management plan

Kien Giang Province has 205 km of coastline and it is estimated that at least one third (33 %) of this coastline is being badly eroded (Duke, Wilson, Mackenzie, Nguyen, & Puller, 2010). This shoreline
has more than 5,000 ha of mangrove protection forests, forming a thin green line of salt-tolerant vegetation that buffers and protects valuable farming lands from rising seas and storm damage. This tacit coastal defense is threatened by development activities, illegal tree cutting and global climate change, as predicted rises in sea levels take effect. A great number of government agencies are currently responsible for managing different aspects of this area, such as:

- Forestry section, forest protection management boards (DARD) manages mangrove forests
- Fishery section (DARD) manages fishing and fish farming activities
- Irrigation section (DARD) manages dykes and water drainage systems (canal, sluice gates, dams and dykes)
- Department of the Natural Resource and Environment (DONRE) manages in-shore and off-shore areas.
- Local authorities manage livelihood and economic development

The sustainable management of coastal areas under the threat of climate change cannot be left to the standard sectoral planning and management approach of the government. This approach is not effective due to the lack of collaboration among agencies. The PPC understands the need for an integrated, multi-sectoral coastal management plan for socio-economic development and natural resource management and requested assistance from the GIZ project and the BRMB to develop a management plan. An evidence based plan was developed with consultation from a wide range of stakeholders. Collectively, the management plan contributes to a range of provincial and national government policies:

- Decision No 172/2007/QD-TTG approved the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020;
- Decision No 158/2008/QD-TTG of the Prime Minister on approval of the National Target Program to Respond to Climate Change;
- Decision 405/KTN of the Prime Minister approved Master Plan for Mangrove Management and Protection in Vietnam (period 2008-2015);
- Decision 667/QD-TTG in 2009 of the Prime Minister approved Program to Strengthen and Upgrade Sea Dyke System from Quang Ngai to Kien Giang;

Main steps used in the development of the integrated coastal management plan in the BR:

1- Mangrove and Coastal condition assessment using Video shoreline assessment technique that was developed by the University of Queensland (Duke, Wilson, Mackenzie, Nguyen, & Puller, 2010)
2- A draft management plan was developed based on the coastal assessment in combination with reports from MRC (2010) and ADB (2011). The plan adapts and uses the criteria of the coastal hazard adaptation strategy approach (Standards Australia/Standards New Zealand, 2009) and the guiding principles developed by the State Government of Queensland, Australia (Department of Environment and Resource Management [DERM], 2012).
3- A consultation workshop was held and chaired by chair of BRMB (who is also Vice chairman of PPC); members of the BRMB (leaders of DOST, DARD, DONRE, DPI, DOF, Forest Protection sub Department, Forest Protection Management Board); Irrigation sub
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department (DARD), Sub Department of sea and island (DONRE), Women's Unions, Farmer’s Association, leaders of coastal districts and communes and GIZ project staff. This workshop provided an opportunity for discussion and the sharing of information among decision makers, planning agencies, local authorities and local people.

4- The final management plan was upgraded to reflect the conclusions of the consultation workshop. The plan has now been endorsed by the BRMB and submitted to PPC. PPC has submitted the plan to relevant ministries (MARD, MONRE, MPI, The Standing office of the support program to response to Climate change - SPRCC) and donors are currently discussing funding options with the PPC.

Figure 2. Integrated Coastal Management for Climate Change: Plan for Erosion Management, Mangrove Restoration and Coastal Livelihood for Kien Giang Province

3.2. Integrated planning for conservation and development of the Dong Ho Lake

Dong Ho is an estuarine lake with a north-south length of around 4.6 km and east-west around 3.5 km (Chuan, 2011, Tuan & Chuan, 2011), adjacent to Ha Tien town, close to the Viet Nam-Cambodian border. The focal area is 1,384 ha, of which about 903 ha is water, 250 ha is natural vegetation, including nypa palm (Nypa fruticans), 29 ha is used for gardens and 171 ha for aquaculture (Huynh, 2011).

Immediate attention required
Actions required in the near term
Actions required in the medium term
Dong Ho lake is significant in Kien Giang Province because of its ecological character, its aesthetic qualities, and its historical, cultural and socio-economic links to the local community and Vietnam. It has provided fish, crabs and clams for residents and inspired many by its beauty, as expressed in the poetic and artistic record. However, the sustainability of the lake is at risk, along with its ability to provide the ecosystem services that the current generation need for their livelihood, and its ability to bring socio-economic benefits to future generations. The lake is subject to a variety of environmentally degrading processes, including infrastructure development, high rates of sedimentation, wastewater pollution, and intensive resource extraction and is highly vulnerable to the impacts of rising sea levels and altered floodwater regimes.

In response to the rapidly emerging concerns for the future of the lake, the PPC, with support of
BRMB and GIZ started to develop a plan that aims to guide sustainable development and conservation of the lake and its surrounds.

In early 2009, the Kien Giang People's Committee assigned the task of coordinating the adjustment of the master plan for Dong Ho to the Department of Agriculture and Rural Development and Ha Tien town. The resulting proposal used the sectoral approach (fishery development) which was found to be unacceptable by PPC.

In 2011, at the request of PPC and the BRMB, the GIZ project agreed to provide support to develop a master plan for Dong Ho that uses the multi-sectoral planning approach and aims to achieve the objectives of sustainable conservation, restoration and development, including protection of its historical and cultural values. An international conference was organized by BRMB with the participation of over 200 international, national experts, governmental staff, provincial leaders, industry and local people to discuss the future planning and management issues for the lake. The final conclusions of the workshop were: (1) Dong Ho Lake will be maintained as a brackish water body; its ecosystem, biodiversity, culture, education and scientific values will be preserved as well as its aquatic resources; and (2) The plan will have a long term vision that balances conservation and development and integrates the plan through multi sector involvement.

A document titled “Guidelines for integrated planning for conservation and development of the Dong Ho lake, Vietnam” were developed by GIZ project in strong consultation with BRMB. The document was endorsed by the Kien Giang BRMB in 2012 and it will be used to direct future planning and management of the lake. The main planning principles of the guidelines are:

- To maximise protection of remnant and regenerating plant communities;
- To restore plant communities that buffer the waters of the lake from nutrient and sediment pollution;
- To minimize inflows of sediment, nutrient and toxic chemical pollutants;
- To maintain the hydrodynamics of the lake and its associated marine system;
- To achieve sustainable use of natural resources; and
- To foster the protection and celebration of the natural and cultural values of Dong Ho and its surrounds as part of the socio-cultural character of the local community as well as that of the Province and Vietnamese people.

4. Conclusion

The Biosphere Reserve has proved to be an important instrument in the protection of the natural resources of Kien Giang Province in the context of the rapid socioeconomic development. With technical assistance and capacity building from the GIZ project, the University of Queensland and others, provincial agencies have been able to make the Biosphere Reserve operational. The current integrated coastal management plan and integrated planning for conservation and development of the Dong Ho Lagoon are only two examples of how the BR can be used as a cross-sectoral management tool to overcome the limitations of the sectoral planning for sustainable management and use of natural resources. This provides a lesson for other biosphere reserves.
5. References


