

Protecting the Green Turtle through Integrated Coastal Management

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Key Message

- Efforts to conserve the green sea turtle and its habitat cannot be successful without strong political will from both national and local governments, stakeholders support (especially community), and technical and management capabilities as well as sustained financing over the long term.
- The application of ICM system in Sukabumi enabled the local government to put in place key governance elements which strengthened interagency

and stakeholder coordination and partnerships, reinforced legislation, created public awareness, built capacity, and mobilized community participation in its conservation program.

Abstract

Sukabumi is the only place along the southern coastline of West Java where sea turtles nest. Dominant in all nine nesting locations including Pangumbahan beach is the green turtle (*Chelonia*

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mydas). Recognized as the official symbol of Sukabumi Regency, the species' existence has been threatened by human activities including rampant turtle egg collection and unregulated invasion and utilization of its habitat by coastal tourism development and sand mining,

Previous private sector management of the beach under local government license allowed a proportion of collected eggs to be sold while the rest were hatched for release. However, scientific assessments indicated a large decline in turtle population.

The local government regained management in 2008, developing and implementing a turtle conservation program as part of Sukabumi's integrated coastal management (ICM) program. The national government, through the Ministry of Marine Affairs and Fisheries (MOMAF), declared Pangumbahan Beach as a conservation area and provided support for the establishment of a turtle conservation center.

The program ensured that all turtle eggs were allowed to hatch and the hatchlings released. An increase in the nesting population and number of eggs and hatchlings released relative to the private concession period was evident. Regulated ecotourism was permitted in the conservation area to promote education and awareness of turtle conservation and provide economic opportunities for local people.

The case study demonstrates the concerted efforts of the local and national governments and various stakeholders to put in place necessary governance mechanisms and actions using ICM approaches, to ensure that the green turtle, the natural heritage and symbol of Sukabumi Regency, remains protected.

Background

Sukabumi Regency is located in West Java province on the south coast of Java Island, about 120 km away from Jakarta, Indonesia's capital. It is a part of the rapidly growing economic region of Jakarta and surrounding cities and regencies.

Sukabumi Regency has a coastline of about 117 km and coastal area of about 136,485 ha, covering nine subdistricts. It has nine turtle nesting areas located in the Ciemas and Ciracap subdistricts, namely: Pangumbahan, Hujungan, Karang Dulang, Legon Matahiang, Citirem, Batu Handap, Cibulakan, Cebek, and Cikepuh. Eight sites are managed by the Natural Resources Conservation Unit of the Ministry of Environment and Forestry. One site, located in Pangumbahan, is managed by the Local Government of Sukabumi Regency.

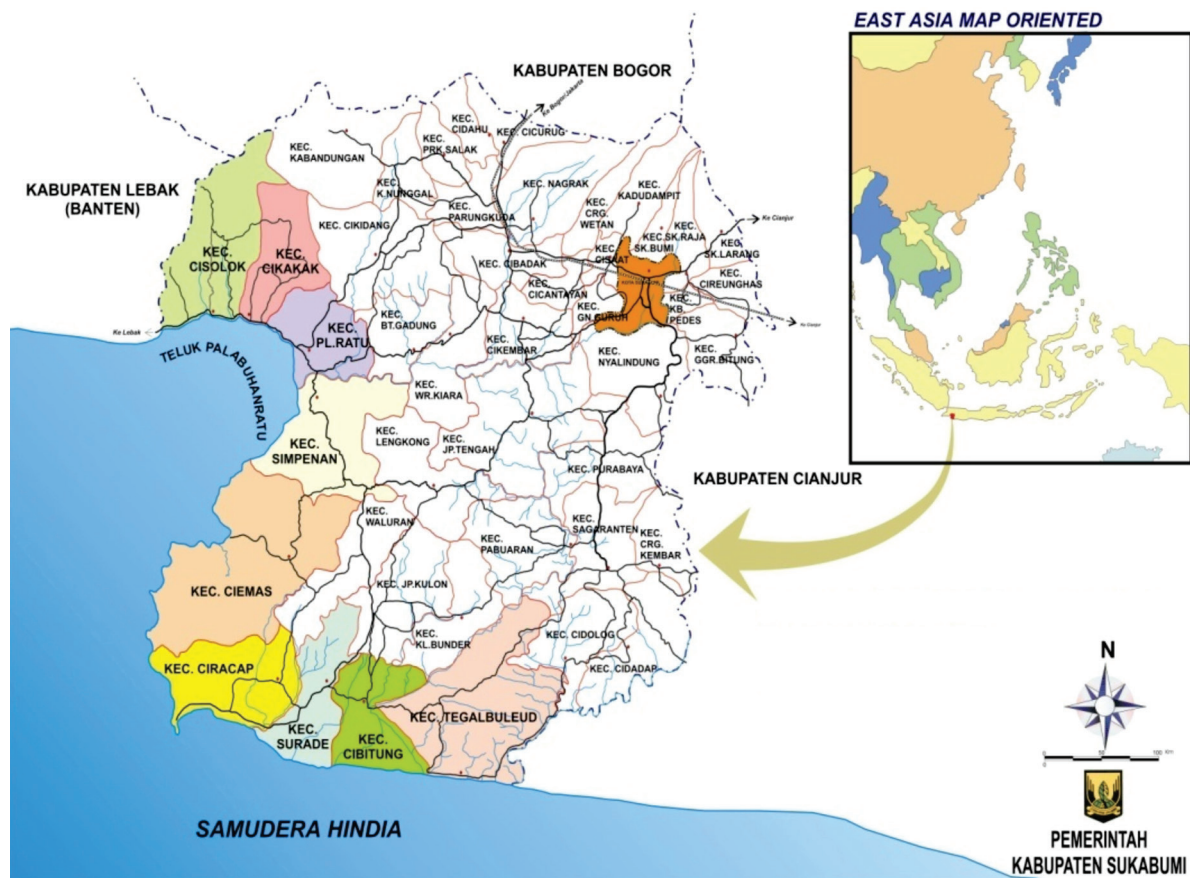
Indonesia has six species of turtles: starfruit turtle (*Dermochelys coriacea*), squama/shell turtle (*Eretmochelys imbricata*), fission/cracked turtle (*Lepidochelys olivacea*), crock turtle (*Caretta caretta*), flat turtle (*Natator depressus*), and green turtle (*Chelonia mydas*). The green turtle has become the dominant species in all turtle nesting areas of Sukabumi; it was recognized as the symbol of Sukabumi Regency and inscribed in the regency's official logo.

Pangumbahan Beach

Pangumbahan Beach is considered the most important green turtle nesting area along the coast of Java. It was officially listed by the International Union for Conservation of Nature (IUCN) in 2004 as one of three locations in Indonesia and among thirty other locations in the world considered as location index sites for green turtle population observation.

Pangumbahan Beach is located in Pangumbahan Village, Ciracap District, near the coastal tourism

Figure 1. Map of Sukabumi Regency (Kabupaten Sukabumi). The regency is located in the south coast of West Java Province bordered by Palabuhanratu Bay and Lebak Regency of Banten Province on the west, Bogor Regency and Cianjur Regency of West Java Province on the north and east respectively, and the Indian Ocean on the south. The regency is composed of 47 districts, 9 of which are located along the coast. (Source: Government of Sukabumi Regency).



area of Ujung Genteng, about 150 km from the city of Sukabumi (Figure 1).

Management issues and threats to sea turtle population in Pangumbahan

Some form of sea turtle management in Pangumbahan began as far back as 1907 under license from the Dutch Colonial Government, and in 1957, a “tender system” was implemented (Wiadnyana and Nastiti, 2013). From 1973 to 2008, a private company, CV Daya Bhakti,

signed a series of concession agreements with the local government of Sukabumi Regency and the provincial government of West Java for the management of turtles in the area (Table 1). From 1973 to 2001, the license issued to CV Daya Bhakti allowed the concession holder full authority to manage the harvest of turtle eggs for commercial purposes. From 2001 to 2005, the license specified that 30% of the turtle eggs should be allocated for conservation purposes (i.e., allowed to hatch), while 70% could be used by the concession holder. In the period 2005-

Table 1. Chronological development in management institutions of Pangumbahan Turtle Park (Sukabumi Fisheries and Marine Agency, 2013; Nastiti, et al., 2009, cited in Wiadnyana and Nastiti, 2013).

Period	Management institutions
1973-1979	CV. Daya Bakti licensed by Head of Sukabumi Regency
1980-1990	CV. Daya Bakti licensed by Head of Sukabumi Regency
1990-2001	CV. Daya Bakti licensed by West Java Governor
2001-2005	CV. Daya Bakti licensed by Head of Sukabumi Regency based on local legislation No. 2 (2001) regarding tax of swallow bird nest, seaweed and egg turtle (cancelled); 70% of turtle eggs used by concession holder and 30% used for conservation purposes
2005-2008	CV. Daya Bakti licensed based on local legislation No. 16 (2005) regarding the conservation of turtles (cancelled); 50% of turtle eggs used by concession holder and 50% used for conservation purposes
2008	MOMAF issued Regulation No.B-55/Men-KP/II/2008 (14 February 2008) on prohibition of turtle and body part utilization (100% of sea turtle eggs to be hatched)
2008 - present	<p>Pangumbahan and its surroundings established as a conservation zone with status as a coastal park by Decree of Sukabumi Regent No. 523 /Kep.639-Dislutkan/2008</p> <p>Local government of Sukabumi Regency takes over management of sea turtle conservation area based on Local Act No. 5 (2009) regarding sea turtle conservation (100% of sea turtle eggs to be hatched)</p> <p>Pangumbahan Turtle Park and Turtle Conservation Center was launched by MOMAF on 22 December 2009</p>

2008, the license required that at least 50% of the eggs should be allowed to hatch, but illegal collection of eggs continued.

Unregulated harvesting of eggs from nesting beaches was one of the most detrimental human threats to green turtles. Other threats were indiscriminate harvesting of adults such as nesting females, or drowning in fishnets, degradation and loss of coastal and marine habitats, increased pollution, and diseases (IUCN, 2004). These were common threats in Pangumbahan Beach (Hutabarat pers. comm., and Cruz, 2002, cited in IUCN, 2004).

Changes in the nesting habitat, including construction of buildings, beach protection facilities, sand nourishment and/or sand extraction, can also directly or indirectly contribute to decrease in the nesting area and modify natural nesting behavior of adults

and hatchlings (Lutcavage, et al., 1997 and Ackerman 1997, cited in IUCN, 2004). Coastal road development accompanied by artificial lighting also affects nesting behavior and can confuse hatchlings (Witherington and Bjorndal, 1990, and Witherington, 1992, cited in IUCN, 2004). In Sukabumi Regency, development of tourism facilities along the coastline, increased marine litter on the beach, marine pollution, sand mining, and port development were further worsening the situation.

Decline in sea turtle population

IUCN's analysis of published information showed extensive decline in green turtle population in all major ocean basins over the last three generations as a result of overexploitation of eggs and adult females at nesting beaches, juveniles and adults in foraging areas, and to a lesser extent, incidental

mortality relating to marine fisheries and degradation of marine and nesting habitats. At Pangumbahan in particular, a decline in green turtle egg harvest from 2,500,000 in the 1950s to 400,000 in the 1980s was recorded (Schulz, 1987, cited in IUCN, 2004). Based on this statistic and applying further analysis and assumptions on population trajectories, the past annual nesting female subpopulation three generations back (estimated at 128.4 years) was 8,333, while the present annual nesting female subpopulation size (in 2001) was estimated at 370, indicating a 96% decline.

Drivers for sea turtle conservation

Results of scientific assessments together with the promulgation of the National Act on Conservation of Natural Resources and Ecosystem (NA 5/1990) and the National Act on Preservation of Fauna and Flora (NA 7/1999), drew increasing recognition among local stakeholders to the decline in green turtle population and the various threats, particularly egg harvesting from nesting beaches by the mid-2000s. There were increasing calls from conservation groups, nongovernment organizations (NGO), academic institutions, relevant agencies, and communities within and outside Sukabumi to improve the protection of sea turtles and to put a stop to the practice of harvesting and trading of turtle eggs.

There was also increasing recognition that protection and conservation of the sea turtles and their habitat would need the coordinated efforts and actions among levels of governments and across various stakeholders at national and local levels. It would also require putting in place necessary governance and management measures to ensure the protection of sea turtles and their habitats while allowing complementary activities that contribute to local economic development.

On 24 February 2003, the government of Sukabumi Regency signed a Memorandum of

Agreement with the GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) for the development of an ICM program, including establishment of an interagency and multisectoral ICM Program Coordinating Committee (PCC) and a Program Management Office (PMO) hosted by the Environmental Board of Sukabumi Regency. A long-term coastal strategy was developed and adopted as guide for undertaking integrated planning and harmonizing funding allocations across various sectors concerned with marine and coastal management.

The enactment of the National Act 27/2007 Concerning Management of Coastal Zones and Small Islands, and the issuance by MOMAF of Regulation No. B-55/Men-KP/II/2008 concerning prohibition of turtle and body part utilization (thus requiring use of 100% of turtle eggs for conservation purposes), provided further basis and guidance to the local government to undertake necessary steps to reduce threats and enhance protection of green turtles in Pangumbahan.

Approach and Methodology

In response to the above driving factors, as well as increasing awareness of marine and coastal conservation, and calls from various stakeholders, Sukabumi Regency initiated the development of a conservation program in 2008 to protect the sea turtles and their habitat in Pangumbahan. This began with the designation of Pangumbahan Beach and its surroundings as a conservation zone with the status of a coastal park by virtue of the Decree of Sukabumi Regent No. 523/Kep. 639-Dislutkan/2008. The conservation area has a coastline of about 2,300 m with a land area of about 115 ha and a sea area of about 1,566 ha.

This was followed by the issuance in 2009 of the Local Act No. 5/2009 regarding Sea Turtle

Figure 2. The launching of the Pangumbahan Turtle Conservation Center on 22 December 2009.



Conservation Area in Sukabumi to replace Local Act No. 16/2005. Local Act No. 5/2009, was promulgated to enable the local government to take over management of the sea turtle conservation area from the private sector, with consensus between CV Daya Bhakti and Sukabumi Regency Government. The regulation mandated the following:

- The sea turtle conservation area will be managed by the local government through the local Marine and Fisheries Agency;
- 100% of eggs hatched into young turtles (*tukik*) will be released into the sea; and
- Ecotourism activities will be developed in accordance with the coastal zoning system.

In support of the local initiatives and as part of the establishment of marine conservation areas under NA 27/2007, MOMAF declared the Pangumbahan Sea Turtle Conservation Area in December 2009 as a Small Islands and Coastal Conservation Area, and launched the development of the Pangumbahan Turtle Conservation Center (Figure 2). This facilitated the provision of funding from the central government to support the sea turtle conservation program in Pangumbahan coastal park.

In accordance with NA 27/2007, subsequent development and adoption of a Coastal Use Zoning Plan for Sukabumi Regency 2012-2032, through Local Act No. 22/2012, specified Pangumbahan as a sea turtle conservation zone.

Development of the Pangumbahan Coastal Park and Turtle Conservation Center

With funding support from the local and central governments, the development of the Pangumbahan Coastal Park and Turtle Conservation Center was implemented as follows:

- 1. Institutional development and capacity building.** A committee was established to lead the development of the Pangumbahan Turtle Conservation Center. A turtle conservation team composed of representatives from the local government and collaborating NGO was formed to serve as the core technical team. The team received training on the application of various techniques for turtle conservation and habitat protection.
- 2. Public socialization.** Intensive public awareness, education, and consultation activities were undertaken with the communities on the development of policies, legislations, and institutional mechanisms related to the development of the sea turtle conservation area, including the designation of common use and conservation areas.
- 3. Preparation of a master plan.** A master plan covering the Pangumbahan sea turtle conservation area was prepared, which identified zones for nature reserves, common recreational area, green belt, and conservation (Figure 3).
- 4. Establishment of infrastructure.** Necessary infrastructure for the Pangumbahan Turtle Conservation Center was put in place including the border fence, entry gate to the conservation zone, guard posts, the Turtle Information

Figure 3. Master plan of the Ujung Genteng - Pangumbahan Area located in Ciracap District. The plan specifies zones for nature reserves (zones 1 and 5), public recreation (zone 2), green belt (zone 3), and conservation (zone 4). (Source: Public Works Agency of Sukabumi Regency).



Figure 4. The Pangumbahan Turtle Conservation Center (L-R): entrance gate, information center, guard post.



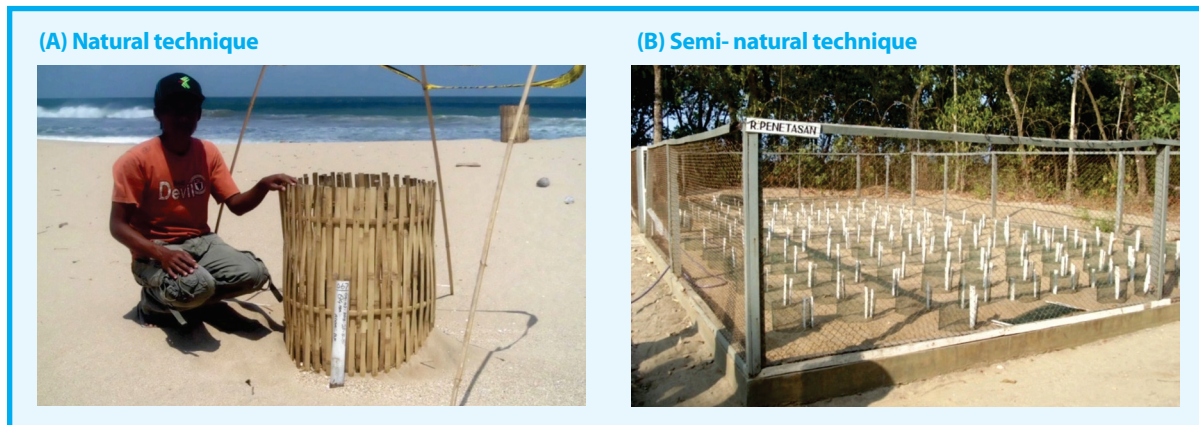
Center, nesting room, *tukik* caring room, employee dormitory, office and meeting hall, etc. (Figure 4).

- 5. Management of the turtle and its habitat.** As the green turtle is sensitive to disturbances, the program gave importance to the management of the turtle population and its habitat.

For managing the turtle population, two techniques were applied – natural and semi-natural (Figure 5).

The natural technique involved having the turtle hatch by itself, without special treatment. The officers only put the label on the turtle's egg hatching place, and monitored and

Figure 5. Two techniques in managing turtle eggs.



protected it. When the eggs hatched, the young turtles were then released into the sea. The percentage of turtle eggs that hatch using this technique could reach 90%, however, operational costs were high as the eggs were very vulnerable to theft, interference, and predation by other animals.

For the semi-natural technique, the eggs were transferred to a hatchery. Hatcheries were located near the egg-laying areas. Officers labeled the egg hatching place and controlled and protected it. Hatchlings were then released into the sea. This technique provided increased isolation of eggs from disturbance, but with a lower hatching percentage (70%). This technique incurred less operational costs compared to the natural technique.

Monitoring of the sea turtle population included the number of nesting population, eggs, hatchlings, and the turtles released to the sea.

To protect the sea turtle habitat, a program to protect and restore coastal vegetation along the 2,300 m coastline of Pangumbahan and the 58.43 ha conservation area was implemented, in conjunction with mangrove restoration and coastal tree planting involving the local communities and other stakeholders.

6. Community empowerment. Programs on community empowerment were gradually implemented to encourage people to switch from being *penggemar* (turtle egg thief) to being turtle protectors (Figure 6) which included:

- Participation in the National Program for Community Empowerment (PNPM Mandiri) which provided support in developing alternative sources of livelihood;
- Involvement in mangrove planting, coral transplantation, and monitoring of coastal and marine resources, including sea turtles; and
- Provision of support in developing economic opportunities to support ecotourism development.

7. Partnerships with the private sector. To sustain the operation of the Pangumbahan Turtle Conservation Center, and leverage available funding from the local and central governments, partnerships were developed with the private sector, academe, and other institutions/organizations. Corporate social responsibility (CSR) programs of private sector partners were initiated to support community

Figure 6. Community empowerment programs include development of alternative sources of livelihood (left) and engaging local people in coastal conservation activities (right).



Figure 7. As part of the development of regulated ecotourism in the Pangumbahan conservation area, visitors could observe turtle egg-laying and release young turtles to the sea.



socialization and empowerment programs, community participation in conservation, improvement of facilities and infrastructure, and supporting sea turtle management through a turtle adoption program.

8. **Development of regulated ecotourism in the area.** One of the objectives of the master plan for the Pangumbahan conservation area was the development of regulated ecotourism in the area, whereby visitors were only allowed to do selected activities such as viewing of turtle egg-laying, visiting the turtle hatchery, and releasing young turtles to the sea (Figure 7). Visitors were also allowed to visit nearby Ujung Genteng Beach to see its beautiful scenery, do surfing and fishing, and enjoy the sunset. A master plan was prepared

for the development of the Ujung Genteng-Pangumbahan integrated tourism zone area.

Other facilities located near the Pangumbahan Turtle Conservation Center included cottages, surfing area, fishing areas, harbor, fishing port, market, palm-sugar factory, and a sunset view area.

Results

Full protection of turtle eggs

The immediate outcome of the management interventions undertaken in the Pangumbahan Turtle Conservation Center was the cessation of turtle eggs harvesting, except for conservation purposes.

Figure 8. Number of nesting population of green turtle in Pangumbahan Beach, Sukabumi Regency, from August 2008 – December 2013, showing the highest number in 2008 and an annual trend peaking in October each year (8a). Although the number of nesting population decreased after 2008, it is still higher than in the numbers prior to 2008 (8b). (Salamsyah, 2007, cited in Syamsuni, 2012; and Sukabumi Fisheries and Marine Agency, 2013).

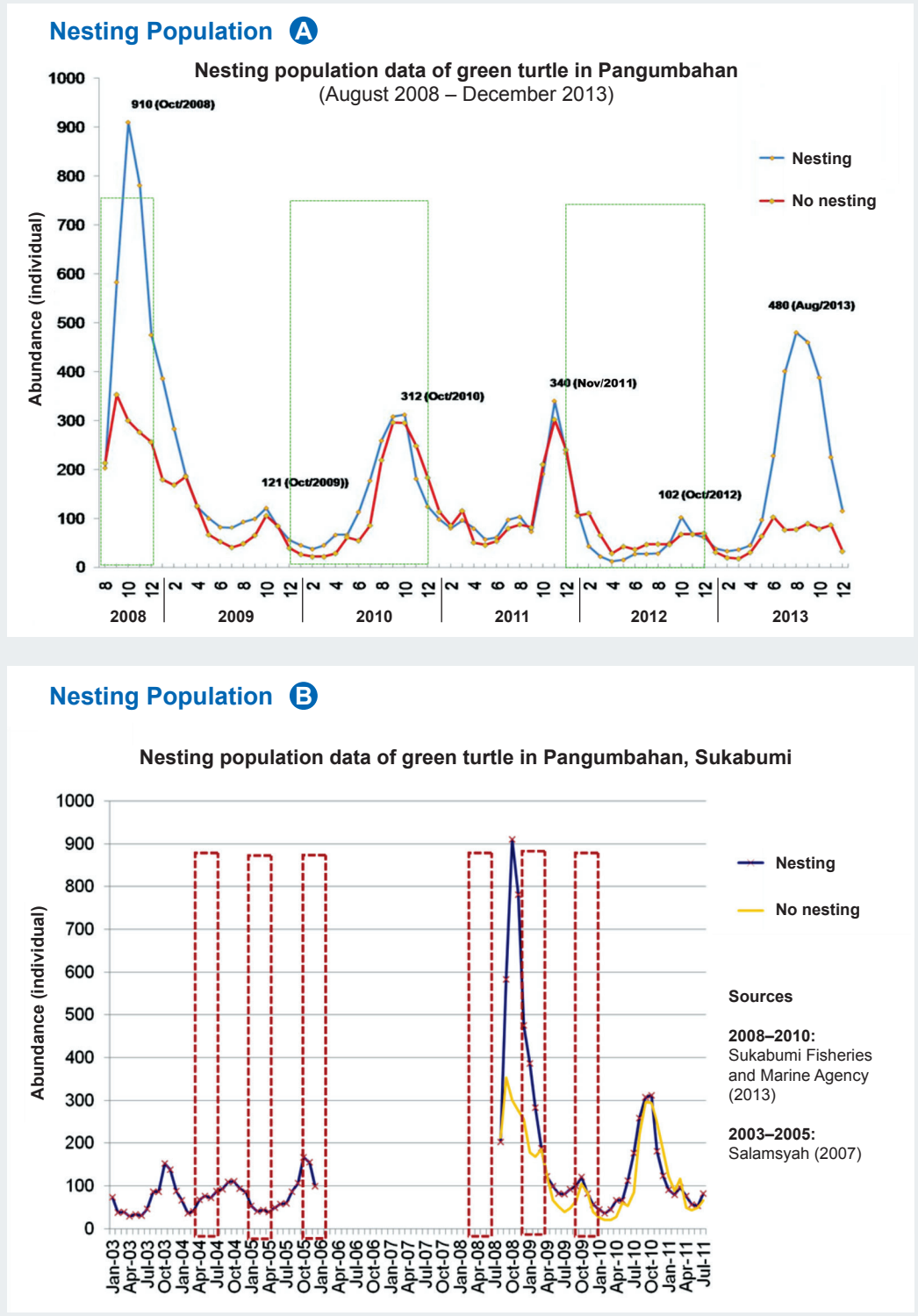
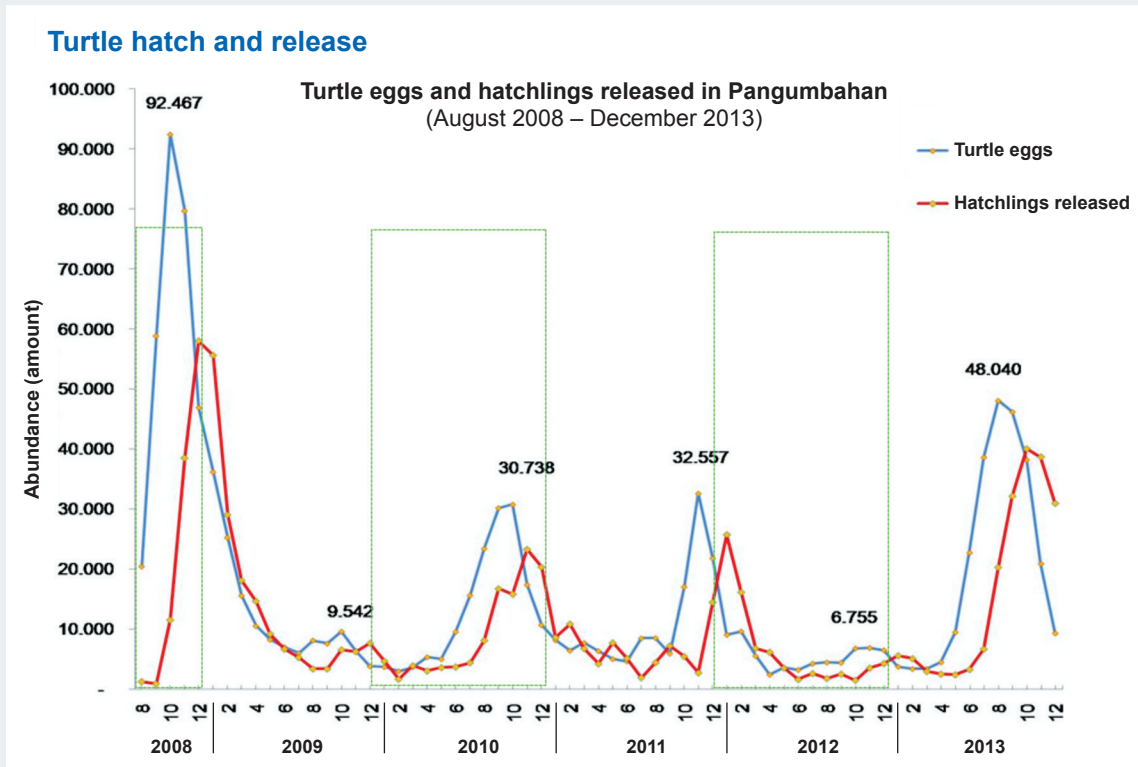


Figure 9. Data on turtle eggs collected and hatchlings released in Pangumbahan from August 2008 to December 2013, showing similar trend as the data on nesting population presented in Figure 8, with the highest numbers in 2008. (Sukabumi Fisheries and Marine Agency, 2013).



Improved monitoring and data collection

Monitoring and data collection were also improved since the local government took over the management of the conservation area. Monitoring data prior to August 2008 were incomplete.

Increase in nesting population, number of eggs, and number of hatchlings released

Available data from August 2008 showed a trend in the number of nesting population, which usually peaks in October of each year, and is low around April – June. The highest number of nesting population was recorded in 2008, with the number decreasing in succeeding years, though still higher than in the years prior to 2008 (Figures 8a and 8b).

Data on the number of eggs and hatchlings released to the sea showed a trend similar to the number of nesting population (Figure 9). Eggs collected were highest in 2008 at around 320,000, after which the number remained relatively stable at around 140,000 eggs in succeeding years (Wiadnyana and Nastiti, 2013).

Available data on the number of turtle eggs in the conservation area during the concession period in 2001–2007, showed a total of 549,693 over seven years. Under the management of the local government, the total number of eggs collected from August 2008 to 2011 was 749,000, exceeding the collection under the private concessionaire (Wiadnyana and Nastiti, 2013).

Similarly, the total number of hatchlings released in 2001-2007 was 19,864 individuals, while for 2008-2011, it was 479,300 individuals (Wiadnyana and Nastiti, 2013).

Other positive changes that occurred were:

- Improved management regime for the sea turtle conservation area and improved capacity of technical staff and stakeholders in protecting and managing the sea turtles and their habitat;
- Increased level of public awareness and participation in marine and coastal resources conservation and environmental protection;
- Increased knowledge and skills of local people on aquaculture practices and post-harvest processing technologies to produce local products even on a small scale as a home industry;
- Increased financial support/investments for sea turtle conservation from the local government, central government, private sector, and other partners;
- Increased number of visitors to the Pangumbahan conservation area, from less than 1,500 in 2008 to close to 22,000 in 2011. The area is also visited for research and scientific studies, marriage rituals of specific ethnic groups, and for media coverage; and
- Increased economic opportunities for the local government and communities related to ecotourism, including provision of transportation and other services and supplies to visitors.

Lessons Learned

The effort to conserve the sea turtle and its habitat cannot be successful without support from the government and all sectors. Key factors that have contributed to the establishment and operation of the sea turtle conservation area based on the experience in Pangumbahan are the following:

- Political support and commitment of the local chief executive (i.e., the regent of Sukabumi) and the support of the local parliament in establishing the institutional and legislative mechanisms to facilitate sea turtle conservation;
- Support of concerned national and local government agencies in developing and implementing the conservation program and providing basic services and infrastructure;
- Use of scientific inputs for consideration in planning and decisionmaking processes;
- Adequate public education, awareness, and participation in the various management processes; and
- Synergistic partnerships among government and private sector and other partners towards achieving common objectives.

The ICM concept and framework, and the process of putting in place the necessary governance elements can enable collaboration and convergence of efforts and resources across different agencies and sectors and facilitate stakeholder participation. This has been demonstrated in the development and implementation of the sea turtle conservation program in Sukabumi Regency.

One key challenge faced in the development of the sea turtle conservation area was the low awareness

of communities in the area on marine and coastal conservation and the impact of their practice of taking turtle eggs for consumption or sale.

To address this, intensive public awareness and education activities can be undertaken in collaboration with local community-based organizations. The communities can also be involved in and consulted during the various stages of program planning, implementation, and monitoring, including actual conduct of conservation activities such as mangrove and tree planting, etc. Law enforcement can be also strengthened leading to apprehension of individuals and establishments that were selling or utilizing sea turtle eggs and other body parts.

Within the ICM framework and using ICM approaches to stakeholder participation and consensus building in Sukabumi, the following governance elements were established:

- Policy, strategies and plans: Master Plan and Zoning Plan for the Pangumbahan Sea Turtle Conservation Area;
- Institutional arrangements: Turtle Conservation Centre and Turtle Conservation Team;
- Legislation: Local Acts issued by the local government in support of turtle conservation;
- Information and public awareness on turtle conservation;
- Financing mechanisms: support by local and national governments, private sector, and other partners; and
- Capacity development: technical training on turtle conservation and habitat protection.

In 2012, proposals by investors to build a sea port and undertake iron and sand mining in the area

were deemed as threats to sea turtle and their habitat. Consequently, a coalition of government agencies and local stakeholders, through their concerted actions, successfully prevented the issuance of permits/licenses to the investors.

Funding for the continuing maintenance and improvement of the sea turtle conservation area remain limited despite support from the central government. It is thus important to continue developing other sources of support and fund raising mechanisms through partnerships with other sectors including the development of limited ecotourism in the area.

Although the mechanisms and facilities to support sea turtle conservation in Pangumbahan are in place, it is recognized that continuing efforts from all stakeholders are still needed in order to sustain the conservation program.

The ICM experience and lessons learned in Sukabumi are expressed in the Sukabumi ICM program website:

“Integrated Coastal Management is not a one-for-all principle; it is a continuous and interactive process; it cannot be successfully implemented overnight and in fully integrated circumstances. The success of ICM program development and implementation is determined by the level of consciousness, awareness, commitment, consistency, capacity and confidence of authority/local government and other stakeholders as well as the presence of a common vision and clear objectives that can be shared by various stakeholders.”

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