

# SITE INFORMATION SHEET

## in support of a formal proposal to nominate a site for inclusion in the IOSEA Marine Turtle Site Network

**1. Date of submission (DD/MM/YYYY):**

The date on which the Site Information Sheet was completed.

04 / 08 / 2014

**2. Name and address of compiler(s), if not the IOSEA Focal Point**

Name and contact information (including affiliation) for the individual(s) who prepared this information sheet, for formal submission through the national IOSEA Focal Point.

Name:

Rowana Walton

Functional Title:

Communications and Outreach Coordinator

Organization:

Seychelles Islands Foundation (SIF)

Address:

La Ciotat Building, Mont Fleuri, PO Box 853, Victoria, Mahé

Email:

[communications@sif.sc](mailto:communications@sif.sc)

Tel. / Fax: +248 432 1735

**3. Country:** The name of the country in which the site is located.

Seychelles

**4. Name of site:** The name of the site (alternative names should be given in brackets).

Aldabra Atoll

**5. Geographical coordinates**

The geographical coordinates (latitude and longitude) of the **approximate centre** of the site, expressed in 'decimal degrees'. For example, the location of the IOSEA Secretariat in Bangkok is 13.763483°, 100.508157°. If the site consists of two or more discrete units, the coordinates of the centres of each of these units should be given. (Add any additional coordinates in a separate annex.)

**Decimal  
Degrees**

-9.415983°

, 46.343278°

**6. General location**

Describe the general location of the site. This should include the site's distance (in a straight line) and compass bearing from the nearest significant administrative centre, town or city. The human population of the listed centre and its administrative region should also be stated. (See also the information requested under point 24: Site Map)

Aldabra Atoll is located in the Western Indian Ocean off the east coast of Africa. It is 1,100 km in a south-westerly direction from Victoria on Mahé Island, the nearest significant administrative city. Victoria city has a population of 26,450 (as of 2010) and is composed of three administrative regions: English River, St Louis, Mont Fleuri. There is no permanent human population on Aldabra.

In the remainder of this document, the codes that appear in square brackets alongside each of the titles below refer to sections of a separate document describing the evaluation criteria, which will be informed by the proponents' submission. **Proponents are encouraged to consult the Evaluation Criteria document<sup>1</sup> for more explanation of the rationale behind each criterion and of the detailed information to be used for evaluation purposes.**

## 7. Area [N3]

The approximate surface area of the site to be included in the network (in hectares or square kilometers). If the site is an island, indicate also the total surface area of the coastline directly relevant to turtle conservation. Area should correspond to the map provided under point 24.)

439.01km<sup>2</sup> – approx. surface area to be included in network  
85.3 km – approx. perimeter of coastline directly relevant to conservation  
154.55km<sup>2</sup> – approx. surface area of terrestrial habitat  
195.87km<sup>2</sup> – approx. surface area of lagoon  
88.59km<sup>2</sup> – approx. surface area of marine protected area

## 8. Physical features of the site [EB1- 4, S5, S6, N1]

Describe the principal physical characteristics of the site, including the marine turtle habitat types occurring at the site. List the ecosystem types included in the site (nesting beach, foraging habitat, reproductive habitat, migratory habitat) and the approximate area in hectares (or km<sup>2</sup>) of each habitat type included. Indicate whether the site's physical attributes are shared by other sites in the country, or are exceptional/unique.

Aldabra Atoll has all ecosystem types represented for the full range of habitat diversity required for the maintenance of marine turtle management units in the IOSEA region. These include nesting beaches (0.25km<sup>2</sup>), foraging habitat (284.46km<sup>2</sup>), and reproductive habitat (284.46km<sup>2</sup>). These characteristics are shared by other locations within Seychelles but Aldabra hosts the largest population of nesting green turtles (*Chelonia mydas*) in Seychelles. Both green turtles and hawksbills (*Eretmochelys imbricata*) are found at Aldabra and both forage and nest there. Loggerhead (*Caretta caretta*) and leatherback turtles (*Dermochelys coriacea*) have been reported in Aldabra waters but are not frequently occurring species.

Flipper tag returns (Mortimer, 2001; Mortimer et al., 2006) and preliminary data from satellite tags (unpublished) attached to several post-nesting female green turtles at Aldabra have shown that there is a tendency to travel into the waters of other Western Indian Ocean countries, demonstrating linkages between Aldabra's nesting grounds and regional foraging habitats. Likewise, Aldabra provides important developmental foraging habitat for green turtles and hawksbills in the region (Mortimer et al., 2003).

Since Aldabra became a nature reserve in 1968 and a UNESCO World Heritage Site in 1982 there has been relatively little to no anthropogenic disturbance to the ecosystems that the turtles inhabit at Aldabra (Mortimer et al., 2011).

<sup>1</sup> Criteria for the Evaluation of Nominations to the Network of Sites of Importance for Marine Turtles in the Indian Ocean – South-East Asia Region, IOSEA Marine Turtle MoU Secretariat. <http://ioseaturtles.org/sitenetwork-evaluation.php>

## 9. Ecological resources [EB1- 4, S5, S6, N1]

Describe the ecological resources at the site, including marine turtles and other noteworthy biodiversity. Describe the marine turtle species / management units occurring at the site, if they are known. Where possible, provide an abundance estimate for each marine turtle species/management unit (e.g. in terms of average number of turtles nesting annually or foraging). Evaluation Criteria EB1a and EB1b offer guidance on how to describe the relative importance of a site frequented by one or more marine turtle species. Indicate whether the site's ecological resources are shared by other sites in the country or are exceptional/unique.

Due to its sustained remote and isolated location, Aldabra Atoll supports many unique terrestrial species, such as the Aldabra Rail (*Dryolimnas cuvieri aldabranus*), Aldabran Drongo (*Dicrurus aldabranus*) and Aldabra Fody (*Foudia aldabrana*). It also has the largest population of Giant Tortoises in the world, with around 100,000 adult Aldabra Giant Tortoises (*Aldabrachelys gigantea*) on the atoll. The mangrove stands are extensive and support thousands of nesting Red-footed Boobies (*Sula sula*) and the second largest nesting colony of Frigatebirds in the world. The lagoon area and associated seagrass beds supply food not only for many green turtles but also for a small population of vulnerable Dugongs (*Dugong dugon*).

Both green turtles (*Chelonia mydas*) and hawksbills (*Eretmochelys imbricata*) are found at Aldabra and nest there. Loggerhead (*Caretta caretta*) and leatherback turtles (*Dermodochelys coriacea*) have been reported in Aldabra waters but are not frequently occurring species.

The most recent population estimate for green turtles at Aldabra is 3,100–5,225 females nesting annually (from 2008 data; Mortimer et al., 2011), an increase of 500–800% in 40 years. Given that the remigration interval of Aldabra green turtles is estimated to be at least 3-5 years (Mortimer et al., 2011) we can extrapolate that the numbers of nesting female green turtles in the Aldabra breeding population is 9,000 to 15,000 individuals, which does not include males or juveniles, the latter being particularly abundant at the atoll. Furthermore, this population estimate was from 2008 data and daily monitoring indicates that the green turtle population has increased since then. The peak nesting period for green turtles at Aldabra are the months of April to June (Mortimer, 2012). A regional study of the wider South-western Indian Ocean found that sea surface temperature probably determined patterns of nesting seasonality (Dalleau et al., 2012).

A study of the genetic structure of the population of green turtles in the South-west Indian Ocean indicates regional genetic differences in these populations. The green turtles sampled at Aldabra showed statistically significant genetic differences from those sampled in the Southern Mozambique channel (Europa and Juan de Nova) (Bourjea et al, 2007). This highlights Aldabra's importance as a green turtle nesting site.

The hawksbill nesting population at Aldabra is much smaller and less well known. Most of the nesting is on beaches in the lagoon, and annual/seasonal nesting numbers are estimated by Mortimer to be less than 30 individuals (SIF, unpubl. data).

## 10. Cultural importance [S1]

Describe the cultural / religious / spiritual importance of the site (e.g. in terms of historical associations, spiritual traditions, religious significance etc.), as well as non-consumptive traditional beliefs/practices, in relation to marine turtles. If possible, provide references to published/unpublished historical or other accounts, which may give an indication of relative importance in a national context.

Aldabra Atoll is a symbol of cultural pride for all Seychellois. Its rich biodiversity, abundance of certain species (e.g., giant tortoises, green turtles, frigatebirds), endemic species, and protected status give the atoll a unique and important national – as well as regional and international - significance.

References that provide published accounts on the history and ecology of Aldabra:

- Abbot, W. L. (1893) Notes on the natural history of Aldabra, Assumption and Gloriosa Islands, Indian Ocean. *Proceedings of the US National Museum* 16: 759-764.
- Amin, M., Willetts, D. and Skerrett, A. (1995) *Aldabra World Heritage Site: Seychelles Islands Foundation*. Camerapix Publishers International: Kenya.
- Stoddart, D. R (1968). The Aldabra Affair. *Biol. Conserv.* 1(1): 63-69.

- Stoddart, D. R (1984). *Biogeography and Ecology of the Seychelles Islands*. Dr. W. Junk Publishers: The Hague/Boston/Lancaster.
- Westoll, T.S and Stoddart, D.R (eds.) (1971). *A discussion on the results of the Royal Society Expedition to Aldabra 1967 – 1968. Phil. Trans. R. Soc. Lond. B., Vol. 260(836): 1 – 654.*
- Westoll, T.S and Stoddart, D.R (eds.) (1979). The terrestrial ecology of Aldabra. *Phil. Trans. R. Soc. Lond. B., Vol. 286(1011): 1 – 263.*

## 11. Jurisdiction [G1]

*The name of the government authority with: (a) territorial jurisdiction over the site, e.g. state/province, region or municipality etc.; and the name/description of the authority with (b) functional jurisdiction for conservation purposes, e.g., Department of Environment, Department of Fisheries, traditional owners, etc.*

- a) Seychelles Government. There is no region or municipality jurisdiction for this site
- b) Ministry of Environment and Energy

## 12. Management authority [G1]

*Name, address and contact details of the body responsible for the direct local conservation and management of the site.*

Seychelles Islands Foundation (SIF)  
 La Ciotat Building  
 Mont Fleuri  
 PO Box 853  
 Victoria  
 Mahé  
 Seychelles  
 Tel : +248 432 1735  
 Email : [info@sif.sc](mailto:info@sif.sc)

## 13. Current protected status and governance framework [G1, S4]

*Describe any applicable legislation / regulations (or traditional laws / norms) relevant to the protection / conservation of marine turtles and their habitats at this site, and comment on their effectiveness. Include details of how any incompatible human activities and/or uses of land and sea at the site are prohibited or mitigated.*

*Mention any nationally relevant protected area status, international conservation designations and, in the case of transboundary sites, bilateral or multilateral conservation measures which pertain to all or part of the site. If a protected area or reserve has been established (at a national/regional level), give the date of its establishment and size. If only a part of the site is included within a protected area, the area of marine turtle habitat that is protected should be noted.*

*International designations may include sites listed under the UNESCO/World Heritage Convention, Man and Biosphere Reserve Network, Ramsar Convention, other site conservation networks, etc. Where appropriate, list the IUCN (1994) protected areas management category(ies) that apply to the site.*

All species of marine turtles have been protected under Seychelles law since 1994. The Wild Animals (Turtles) Protection Act was passed into legislation in 1994. Under this legislation all sea turtle species found in Seychelles waters are protected. The legislation states that:

- (1) *No person shall disturb, catch, injure, fish for, kill, sell, relating to purchase, receive or possess any turtle.*
- (2) *No person shall possess, disturb, sell, purchase, receive, take, remove or cause to be taken or removed any turtle egg either while it is being laid, or after it has been laid, by a female turtle.*
- (3) *Subject to regulation 6, no person shall possess, sell, relating to expose for sale, purchase or receive any raw, worked or treated turtle shell, shell of a turtle.*
- (4) *No person shall sell, expose for sale, purchase or receive any meat product derived from any shell of a turtle.*
- (5) *No person shall possess, sell, expose for sale, purchase or receive any meat or any part of the flesh or calipee of a turtle.*

Aldabra has been managed as a nature reserve and its turtles protected since 1968. Its long term status as a protected area has assisted significantly in the recovery of the nesting green turtle population by 500 - 800% between 1968 and 2008 (Mortimer et al. 2011). Within the protected area of Aldabra, neither turtles nor their eggs are directly threatened by poaching for human consumption.

Aldabra became a 'Special Reserve' under the National Parks and Conservancy Act in 1981: National Parks (Aldabra Special Reserve) Regulations. The entire nominated site of 455km<sup>2</sup> was listed under this protected area status, as '*The group of islands constituting the atoll of Aldabra, together with the bed of and sea in the lagoon and the sea and seafloor within 1 km from the high water mark*'.

Aldabra Atoll was designated as a UNESCO World Heritage Site in 1982 under the World Heritage Convention. It was also designated as a Wetland of International Importance under the Ramsar Convention in 2010. The IUCN (1994) Protected Area management category 1a applies to this site.

#### **14. Land/sea tenure/ownership [G1]**

*Provide details of ownership of the site and ownership of immediate surrounding areas (e.g., state, provincial, private, etc.) which may have a bearing on the conservation of the site. Describe any local or customary law relevant to the land / sea tenure, and explain any terms that have a special meaning in the country or region concerned.*

Aldabra Atoll and its surrounding area are the property of the State, the Seychelles Government. There are no local laws or tenures that currently apply to the area. The operation of the site is overseen by the board of Seychelles Islands Foundation who are elected by their patron, the President of Seychelles.

#### **15. Socio-economic values and land/ocean uses and activities within the vicinity of the site [EB4, G5, S2, S5, S6]**

*Describe, in general terms, the principal social and economic values of the site, including human activities and land uses (past, current and planned) within the vicinity of the site (e.g., agriculture, fishing, resource extraction, grazing, water supply, urban/industrial development, tourism, outdoor recreation, education and scientific research), irrespective of whether or not they are considered to directly impact the conservation of marine turtles. Some indication of the relative importance of each form of land use should be given, whenever possible.*

Aldabra is in such a remote location that human activities and uses of the site are limited and relatively easily controlled. It has the most value as a platform for scientific research and education. Research activities are conducted with full consideration of their impact on the site and Aldabra provides a 'living laboratory' for research on a unique ecosystem with numerous endemic species.

Aldabra is also a popular destination with tourists due to its unique natural environment. But again its remote location makes this a limited activity as it is expensive and difficult to reach the atoll. Also, recent piracy in the region has hampered these visits because of the increased security risk.

The atoll also has substantial education value and is used as an example for many educational and outreach tools and is frequently showcased as a benchmark of outstanding conservation and management. For those children who get to visit (see point 20) it provides incredibly rich insights into the natural world and the importance of conservation.

#### **16. Factors adversely affecting the site's overall ecological character, as well as threats to marine turtles and their habitat at the site [EB4, S2]**

*Describe the human and natural factors negatively affecting the ecological character of the site, both within and in the vicinity of the site. These may include existing, new or changing activities/uses, major development projects etc., which have had, are having, or may have a detrimental effect on the natural ecological character of the site. For all adverse and change factors reported, supply measurable/quantifiable information (if such data exist), as well as information on the scale, extent and trend of the change factor and its impact. For example, describe in terms of the percentage of coastline (or other area) modified/affected by a particular threat; for egg collection, describe in terms of number of nests, per species, per year. Mention also data-deficient threats, where a threat is known to be present but is not quantified. Collectively, this information should provide a basis for monitoring of ecological character of the site.*

Due to its remote location and lack of permanent human population, there are limited human factors that directly affect the ecological character of the site. There are several factors that are natural and/or human mediated:

- Climate change
- Coastal erosion
- Marine debris
- Invasive species

All of these factors have an impact on the nesting habitats available for marine turtles at Aldabra. Marine debris also poses a threat to feeding areas where they could be ingested or entrap feeding turtles. Unfortunately although these factors have been documented at the atoll, it is not possible to quantify the scale of these impacts as the necessary data do not exist currently. Recent unpublished research carried out by SIF for a feasibility study into cat eradication, indicated that turtle hatchlings are the main component of the diet of feral cats in coastal areas. This was also shown in a study by Seabrook (1989).

#### **17. Conservation and management interventions taken [G2, G3]**

*Describe conservation and management interventions already taken at the site to address threats. Note that some of this information may have been recorded in abbreviated form in the IOSEA Site Data Sheets, available online ([www.ioseaturtles.org/reporting](http://www.ioseaturtles.org/reporting)). Any application of coastal and marine spatial planning, or integrated coastal/marine zone management planning, involving or affecting the site should be noted.*

*Describe the management planning process for the site, including the state of implementation of any management plan that has been developed and approved for the site. Describe any other conservation measures taken at the site, such as restrictions on development, management practices beneficial to wildlife, closures of hunting, etc. (Note that information on any monitoring schemes and survey methods should be given under point 19, below.)*

*Where applicable, describe the involvement of local communities and indigenous people in the participatory management of the site, including co-management activities, surveillance and enforcement, and performance evaluation.*

Since its establishment as a protected area there are relatively few natural or human threats to marine turtles at Aldabra. The previous management plan compiled for Aldabra is now out of date but development of a new management plan is scheduled for this year. There will be an upcoming application to extend the marine protected area of Aldabra (see point 18). However the current protected area does already cover the majority of the foraging and nesting areas of the site.

There is no resident human community on Aldabra and the majority of the SIF staff on the atoll are Seychellois. There is also a close partnership between SIF and government departments such as the Ministry of Environment and Energy, in the management of the site.

In short, there are no pressing conservation interventions needed for marine turtle conservation at Aldabra.

## 18. Conservation interventions proposed, but not yet implemented [G2, G3]

*Provide details of any concrete conservation measures that have been proposed, or are in preparation, for the site, including any proposals for legislation, protection and management. Summarize the history of any longstanding proposals that have not yet been implemented, and differentiate between those proposals that have already been officially submitted to the appropriate government authorities and those which have not as yet received formal endorsement, e.g., recommendations in published reports and resolutions from specialist meetings. Also mention any management plan that is in preparation but has not yet been completed, approved or implemented.*

There are several conservation measures that are in preparation for the site. None of these measures have yet received approval from the SIF Board of Trustees or government authorities (where necessary):

- A new management plan for Aldabra Atoll is due to be drafted this year (2014). This will cover all aspects of the operational and conservation management of the atoll. The management plan is an essential tool in steering the future protection of the atoll.
- In support of our invasive species work, a Biosecurity Protocol for the site has been developed. This biosecurity plan will guide the establishment of biosecurity protocols and infrastructure as part of the management of Aldabra Atoll. It provides a background to the current situation on Aldabra with regard to Invasive Alien Species (IAS), includes risk assessments and path analyses and suggests practical and sustainable tasks required to initiate good biosecurity practice.
- Additionally the presence of invasive rats and cats on Aldabra poses a threat to marine turtles via predation of hatchlings (turtle hatchlings have been found to be the main food source of feral cats on Aldabra). A feasibility study for the eradication of these species is in development and due to be completed by the end of 2014.
- Further to the production of a detailed outer reef map by SIF, an extension to the current marine protected area of Aldabra is being proposed. The extended area is not yet confirmed as it is subject to SIF Board approval. Once confirmed, key stakeholders will be consulted and finally the proposal will be submitted to the Seychelles Government for final approval.

## 19. Current / proposed scientific research and monitoring [G4]

*Describe any current and/or proposed scientific research on marine turtles and their habitats, as well as information on any special facilities for research. In particular, describe past and current marine turtle monitoring activities at the site (e.g., tagging, satellite tracking, genetic sampling, nesting and foraging ground surveys, ongoing beach monitoring, etc.). Describe the survey methodology in sufficient detail to allow for an assessment of its efficacy. Indicate the number of years of continuous monitoring, and whether data have been used to estimate trends in the size of the management unit. Cite relevant published papers in support of the submission.*

Current research relevant to marine turtles that is being conducted at Aldabra includes:

- *Regular surveys of Green Turtle nesting beaches (on the outer edge of the atoll)*

A total of 52 coastal beaches have been monitored continuously since 1980, and previous surveys go back to 1967. The largest of these (Settlement Beach) is monitored daily, whilst the others are monitored monthly. The beaches are patrolled at daybreak and researchers count all tracks encountered and classify them into three categories: TD (track with digging) with or without egg laying, ESBO (emergence stopped by obstacle) with no digging because the female was discouraged by obstacles on the beach (i.e., logs, rocks, erosion platforms, and so on), and HM (half moon) with neither digging nor evidence of disturbance (Mortimer et al. 2011). All track locations are marked with a GPS point. These data were used to estimate trends in the size of the nesting female green turtle population in a published paper by Mortimer et al. (2011).

- *Twice monthly surveys of Hawksbill nesting beaches (inside the atoll)*

Following the same protocol as for the green turtle nesting beach surveys, 11 beaches on the inside of the atoll are monitored every two weeks and have been since 1980. To date, these data have not been used to estimate a trend in the size of the management unit.

- *Flipper tagging (with metal tags)*

During the surveys of nesting beaches (both hawksbill and green), any turtles that are encountered on the beach have metal flipper tags attached (if not already present). These titanium tags are attached to both the right and left front flippers and their numbers recorded alongside the nesting/track data. This tagging programme has been continuously conducted since 1995. As of 2012, 3,364 individual nesting green turtles had been tagged on Aldabra (SIF, unpublished data).

Flipper tags are also attached during 'in-water' tagging sessions (Mortimer et al., 2003). During this procedure, immature turtles encountered in the lagoon area are caught by hand and then brought onto the boat where tags are attached following the protocol above.

All turtles encountered on tagging patrols also have several standard measurements taken.

- *Satellite tags on female Green Turtles*

In May 2014 satellite transmitters were attached to two nesting female green turtles on Aldabra. These devices are programmed to transmit location data every five days, although their status is unknown at the time of writing (August 2014). In theory the battery life on these transmitters should enable the device to continue transmitting for 2-3 years but in practice other factors may cause the tags to stop transmitting well before the projected battery life. Previous work with satellite transmitters has been conducted at Aldabra and between October 2011 and July 2012 satellite transmitters were attached to six other nesting female green turtles. The transmitters were attached to the turtle's carapace following an existing protocol used in other tagging projects. Unfortunately all of these tags had stopped transmitting within two months of attachment for unknown reasons, which we hope to have rectified with the latest tagged turtles (SIF, 2012).

- *Beach profile monitoring (monthly)*

Every month, research staff on Aldabra monitor the profile of the main/settlement beach to record erosion, sand deposition, shape changes and potential obstacles to nesting turtles.

## **20. Current / proposed communication, education, and public awareness activities [S3]**

*Give details of any existing and/or planned site-based programmes, activities and facilities for communication, education and public awareness, including training. Comment on potential opportunities for future educational and outreach activities at the site.*

Since 2010 SIF has had an Education and Outreach Programme Officer, as well as a Communications Officer. This team is focussed on raising public awareness about Aldabra (as well as the Vallée de Mai on Praslin Island, central Seychelles, also managed by SIF) as a site of unique scientific and cultural importance. As part of these activities, SIF generously sponsors an annual week-long trip for 14 Seychellois schoolchildren to Aldabra as the star prize in the national EcoSchool competition. This national competition encourages schools to participate in environmental activities throughout the school year. During the visit to Aldabra the children have the opportunity to experience and learn about the atoll first-hand, participating in some of the scientific research activities. This yearly trip has been conducted since 2000 with approximately 14 children visiting the site, although unfortunately piracy activities off the East African coast stopped the trips from 2009–2014.

Research and other activities at Aldabra (including marine turtle research) are also communicated through the SIF monthly e-newsletter, annual reports, social media posts (Facebook, Twitter) and outreach events on the largest of the main islands of Seychelles: Mahé and Praslin.

## 21. Financial resources available for management of the site and other activities [G5]

Identify human and financial resources (including in-kind contributions) available to support immediate and near-term activities, as well as resources available to sustain site-based activities in the longer-term (e.g. in relation to monitoring, management interventions, surveillance and enforcement, and performance evaluation).

Aldabra has a unique twinning arrangement with Seychelles' second World Heritage Site, the Vallée de Mai on Praslin Island, whereby the ticket sales from the Vallée de Mai are utilised by SIF to finance operations and research at Aldabra. This is a long-term financing strategy that is relatively stable. Financial resources for short-term projects are also acquired from external funding bodies such as the European Union, Global Environment Fund and UNESCO.

In terms of human resources, SIF builds local capacity through intensive on-the-job training and by supporting students on the BSc Environmental Science programme at the University of Seychelles, and by recruiting trainee ranger staff from the local Maritime Training School.

## 22. Additional resource needs at the site [G5]

Where specific needs are identified (e.g. skilled personnel, specialised training, facilities, field equipment etc.) indicate how marine turtle conservation activities are presently impaired on account of their unavailability (e.g. inability to carry out regular surveys, to conduct certain types of research, to monitor certain parts of the range etc.) This information may be useful for compiling a general picture of deficiencies and resource needs that could be presented to potential programme sponsors.

There are extremely high operational costs associated with simply operating Aldabra because of its isolated and remote location. This means that additional resources are always needed to continue the long-term research programme at the site and dedicated funding needs to be raised for any specific additional project or research work.

In particular, an additional boat would ensure that staff could always reach all beaches on the atoll where turtle research activities need to be conducted (currently not always possible due to shortage of boats).

In addition, field equipment is always needed and put to immediate use, for example GPS units, headtorches, binoculars, and underwater gear for in-water capture. To increase the accuracy of the data collected on turtle nesting surveys at the site, a computer programme has been developed that can be used on handheld devices to collect more accurate data in the field. We are aiming to implement this new data collection process but to do this successfully, several new 'Trimble' handheld devices need to be acquired.

## 23. References [e.g. S1, G2, G4]

List key references relevant to marine turtle records and to the site, including management plans, major scientific reports, and bibliographies. When a large body of published material on the site is available, only the most important references need be cited, with priority being given to recent literature containing extensive bibliographies. Reprints or copies of the most important literature should be appended whenever possible. Provide website addresses of references where available.

Bourjea, J., Lapègue, S., Gagnevin, L., Broderick, D., Mortimer, J.A., Ciccione, S., Roos, D., Taquet, C. and Grizel, H. (2007) Phylogeography of the green turtle, *Chelonia mydas*, in the Southwest Indian Ocean. *Molecular Ecology* 16:(1),175.

Dalleau, M., Ciccione, S., Mortimer, J. A., Garnier, J., Benhamou, S., Bourjea, J. (2012) Nesting phenology of marine turtles: Insights from a regional comparative analysis on green turtle (*Chelonia mydas*). *PlosOne*, 7(10): 1-13.

Mortimer, J.A. (2001) Turtle Talk: International migrations of sea turtles tagged at Aldabra. Seychelles Islands Foundation Newsletter 7, 1-3.

Mortimer, J.A. (2012) Seasonality of green turtle (*Chelonia mydas*) reproduction at Aldabra Atoll, Seychelles (1980-2011) in the regional context of the Western Indian Ocean. *Chelonian Conservation Biology* 11(2): 170-181.

Mortimer, J.A., Collie, J., Jupiter, T., Chapman, R., Liljevik, A. & Betsy, B. (2003) Growth rates of

immature hawksbills (*Eretmochelys imbricata*) at Aldabra Atoll, Seychelles (Western Indian Ocean). Pp. 247-248. Proceedings of the 22nd Annual Symposium on Sea Turtle Biology and Conservation. NOAA Tech Memo NMFS-SEFSC-503.

Mortimer, J.A., Jupiter, T., Collie, J., Chapman, R., Liljevik, A., Betsy, B., Pimm, R., Stevenson, J., Laboudallon, V., Assary, M., Augeri, D. & Pierce, S. (2006) Trends in the green turtle (*Chelonia mydas*) nesting population at Aldabra Atoll, Seychelles (WIO) and their implications for the region. Pp. 75-77. Proceedings of the 23<sup>rd</sup> Annual Symposium on Sea Turtle Biology and Conservation. NOAA Tech Memo. NMFS-SEFSC-536.

Mortimer, J.A., von Brandis, R.G., Liljevik, A., Chapman, R. & Collie, J. (2011) Fall and rise of nesting green turtles (*Chelonia mydas*) at Aldabra Atoll, Seychelles: Positive response to four decades of protection (1968-2008). *Chelonian Conservation and Biology* 10(2): 165–176.

Mortimer, J.A. & von Brandis, R.G. (2013) Mortality of adult green turtles (*Chelonia mydas*) at the nesting beaches of Aldabra Atoll, Seychelles. *Chelonian Conservation Biology* 12(1): 151-157.

Seabrook, W. (1989) Feral cats (*Felis catus*) as predators of hatchling green turtles (*Chelonia mydas*). *Journal of Zoology*, 219(1): 83 – 88.

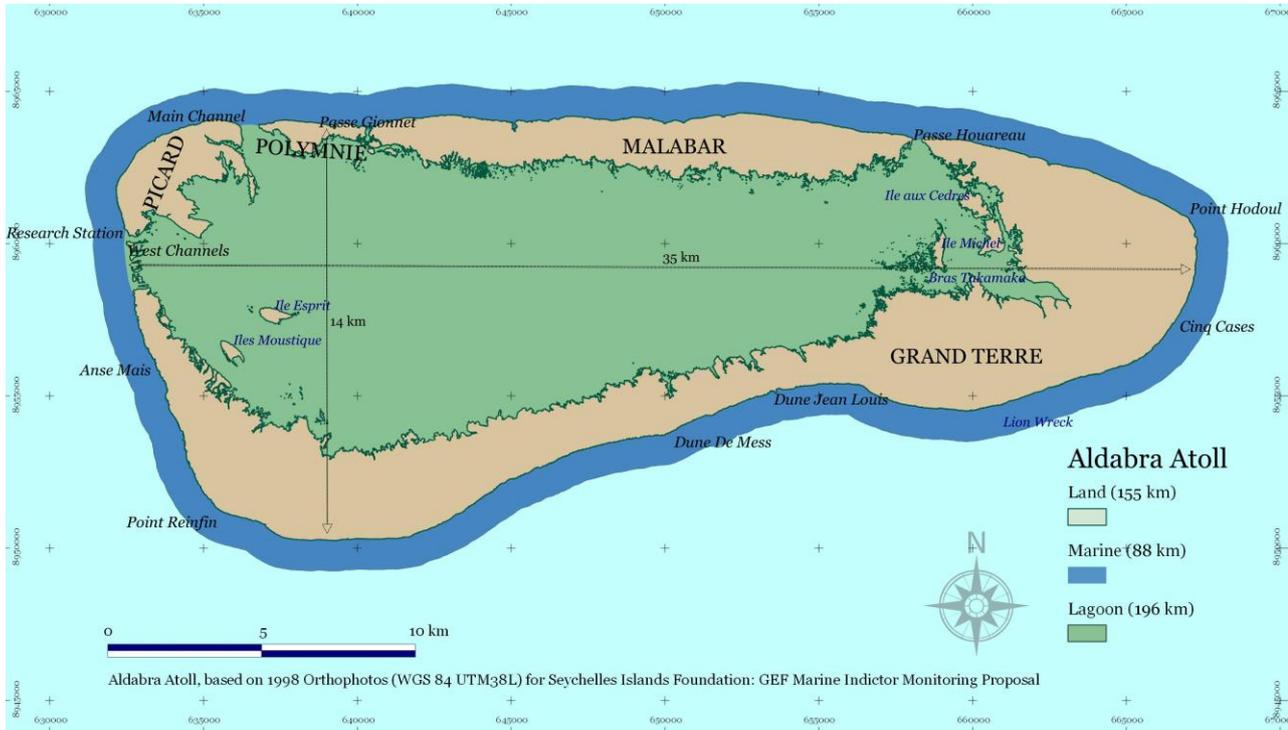
SIF (2012) *SIF Annual Report*.

## 24. Site map [N2, N3]

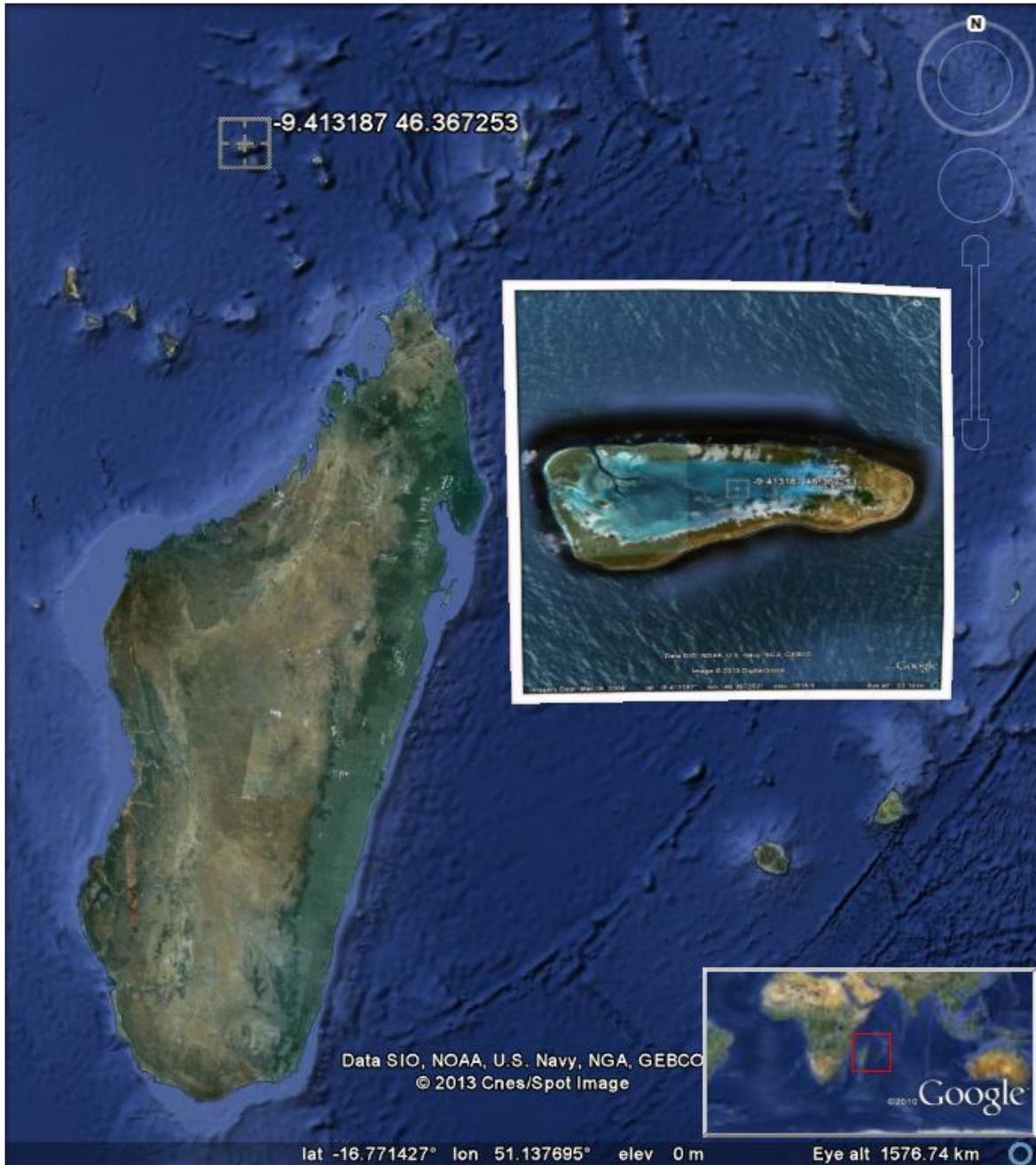
*The most detailed and up-to-date map of the site available should be appended to the Site Information Sheet in digital and/or hardcopy format. The ideal site map will clearly show the area boundaries of the site, scale, latitude, longitude and compass bearing, administrative boundaries (e.g., province, district, etc.), and display basic topographical information, the distribution of the main site habitat types and notable hydrological features. It will also show major landmarks (towns, roads, etc.). Indications of land use activities are especially useful.*

*If applicable (and available), provide a zoning scheme to indicate areas where certain activities that might be incompatible with turtle conservation are permitted, buffer zones, and areas where such activities are not permitted (i.e. sanctuary areas).*

*The optimum scale for a map depends on the actual area of the site depicted. Generally the map should have a 1:25,000 or 1:50,000 scale for areas up to 10,000 ha; 1:100,000 scale for larger areas up to 100,000 ha; 1:250,000 for areas exceeding 100,000 ha. In simplest terms, the site should be depicted in some detail. For moderate to larger sites, it is often difficult to show detail on an A4 sheet at the desired scale, so generally a sheet larger than this is more appropriate. While an original map is not absolutely necessary, a very clear image is desirable. A map exhibiting the above attributes will be more suitable for scanning.*



**Map 1.** Map of Aldabra Atoll (provided by the Site proponent).



Map 2. Google Earth map of Aldabra Atoll (provided by the IOSEA Secretariat).