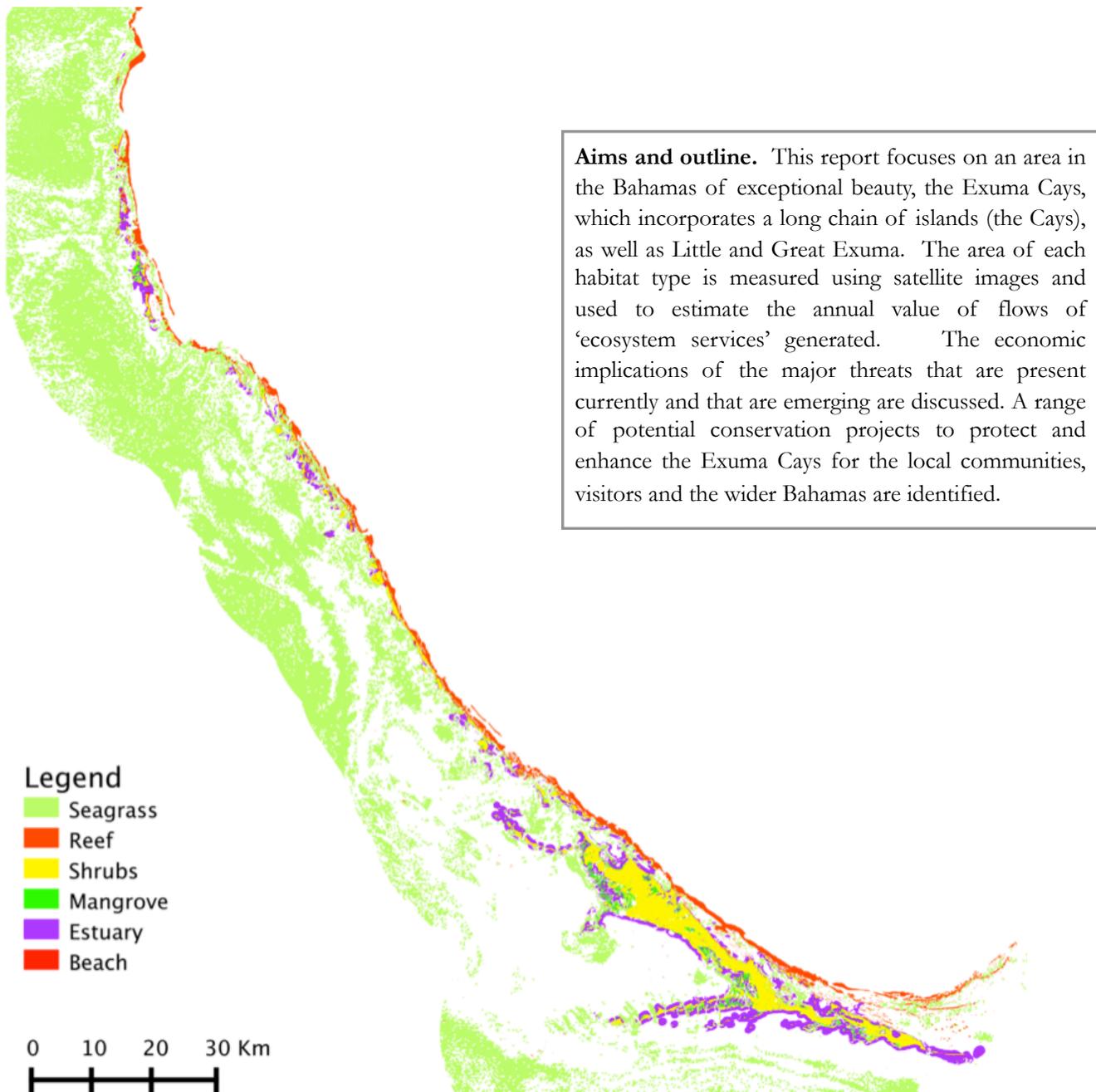


## The Economic Value of Ecosystem Services in the Exumas Cays; Threats and Opportunities for Conservation.

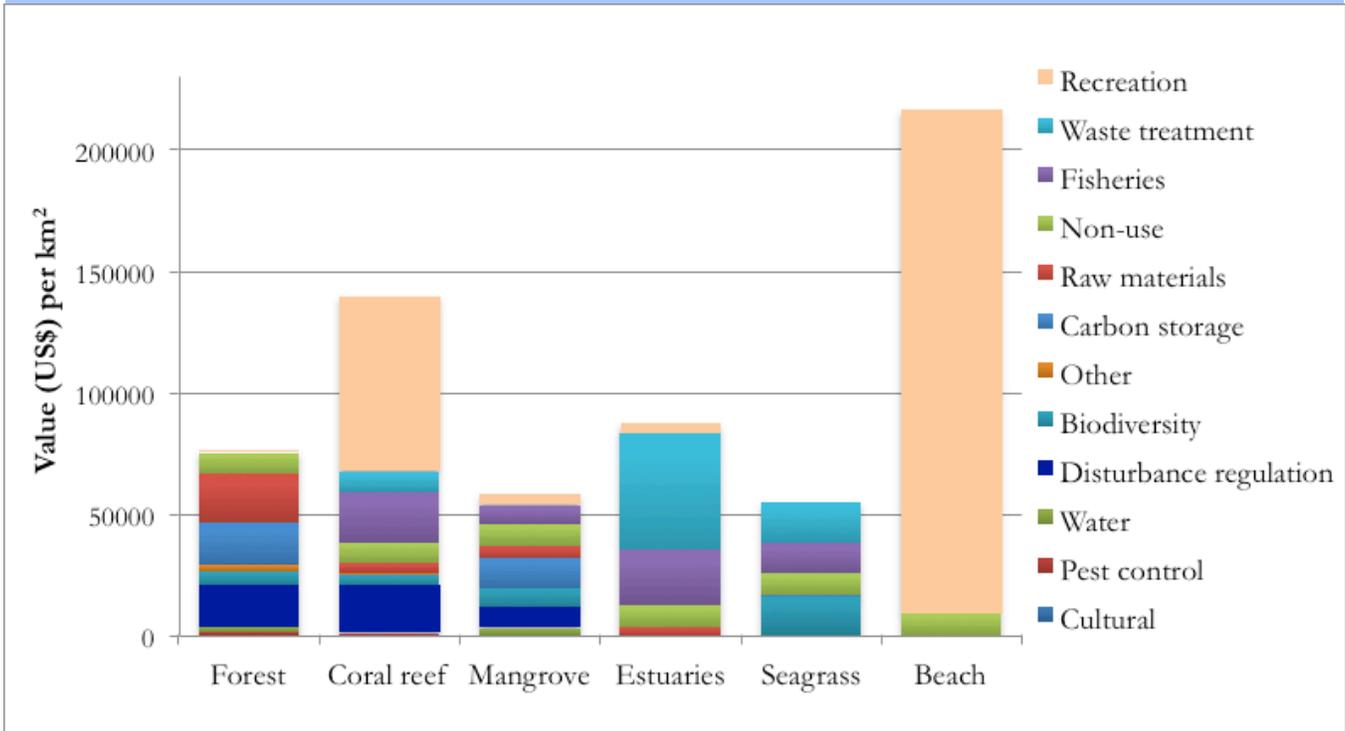
**Background.** Globally there is an increasing awareness of the link between healthy ecosystems, human welfare and sustainable economies. Where ecosystems have been allowed to degrade, human health and welfare have suffered. In contrast, in areas where the ecosystems have been protected and managed effectively, ecological, economic and social benefits have emerged, as a result of sustainable fishery and tourism industries, the support of ecosystem services such as recreation, waste assimilation, water quality and carbon storage. These ‘ecosystem services’ contribute directly and indirectly local and national economies and human welfare. Poor awareness of the value of healthy ecosystems often means conservation investment and actions are inadequate.



**FIGURE.** Classification of the Major Habitats of the Exuma Cays, based on Satellite images

**RESULTS: ECOSYSTEM SERVICE VALUES**

The major habitats in this area are seagrass beds, coral reefs, mangroves, shrubland, beaches and estuaries, which can be measured using satellite images. Each habitat provides different types and sizes of ecosystem services, which benefit humans directly from consumptive use (fisheries), non-consumptive use (recreation, education) and indirect use (shoreline protection, erosion control, water quality). While value transfer is subject to uncertainty, it is able provide an indication of the ecosystem service values in Exuma. Values were based on conservative estimates reported in the literature. Recreational values were based on visitor statistics and non-use values came from a visitor survey. Where possible, each service value was estimated per km<sup>2</sup> of habitat. Given a number of service values which could not be estimated, this is likely to be a minimum value for this area.



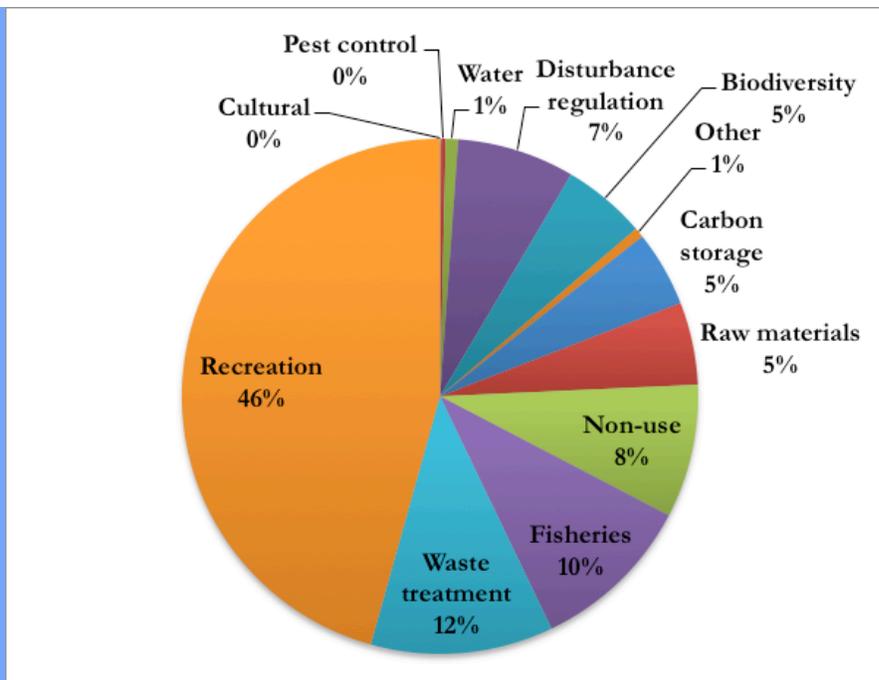
**FIGURE.** The relative contribution of different ecosystem services per km<sup>2</sup> of habitat.

**SUMMARY.**

The habitats on Exuma provide an estimated average of \$105,000 per km<sup>2</sup> per year in ecosystem services (ranging from \$58,000 for estuaries to \$216,000 for beaches).

Given habitat area estimates, the Exuma area enjoys \$230 million in annual ecosystem service flows. Over the next 25 years, this equals a benefit of \$4.1 billion (r= 3%).

Conversion of natural habitats in the Exumas is likely to involve a loss of at least \$55,000 in annual benefits for each km<sup>2</sup>



**FIGURE.** Proportion of Value Generated by Different Ecosystem

**Threats.** The value estimates make clear what is at stake if these areas are lost or degraded. Currently, the Exumas is subject to a number of threats that are likely to reduce the value of this area. The most pressing current threats are poorly carried out and excessive coastal and tourism related development, pollution, sewage, lack of environmental monitoring and management, invasive species and lack of compliance to fisheries regulations. Threats that are of great concern in the near future include commercial fisheries declines, loss of scenic beauty, biodiversity loss, global warming, sea level rise, coral bleaching and ocean acidification. Each threat can add cumulatively and in complex ways to environmental degradation, until a tipping point is reached, where decline is extreme and irreversible. The potential losses in values and the loss in income, jobs and welfare could be large, if ecosystems health is not properly protected.



Reducing stress from threats that can be managed, such as sewage and pollution, is critical as it provides ecosystems with greater resiliency to recover from threats over which there is little control, such as climate change. Many of the same habitats are found in nearby Florida, where the coastal environment has declined, due the lack of awareness of such ecosystem services, many of which are unappreciated until they are gone. Governments and NGOs are instigating huge campaigns worth billions of dollars to restore ecosystems and reduce the incidence of coastal pollution, toxic zones, waste and fisheries declines, with only limited success. It is always cheaper to protect habitats than restore habitats and certain changes, such as fishery collapses can be irreversible.

## RESULTS: OPPORTUNITIES FOR CONSERVATION

The Exumas could act as a flagship area for conservation to avoid regional environmental decline. Potential actions to protect and enhance the benefits from natural habitats in the Exumas, which would benefit a number of stakeholders are;

- Habitat related projects including mangrove replanting, coral transplantation and artificial reefs.
- Eco-tourism projects including a turtle hatchery and eco-centre, certification courses for guides and pursuing world heritage status inscription.
- Fisheries related actions including protection of spawning aggregations, education to promote fisheries regulations, greater anti-poaching patrols in Exuma Park, lion fish removal programs, conch aquaculture and funding for recently established marine protected areas.
- Development related projects including regulations to reduce the environmental impact of construction, standards for sustainable buildings, scenic beauty standards, limits on the extent of coastal development, moorings throughout the Cays, renewable energy investment, sewage treatment regulations and recycling.

## RESULTS: VISITOR FUNDING FOR CONSERVATION

Visitor surveys using the contingent valuation methodology showed that a hotel surcharge could raise \$1 million towards conservation annually, to help preserve this area now and for the future.

Respondents stated they would pay \$14.20 more per day to visit this area if it were to be a World Heritage Site. Since 13% would not pay anything, we estimate that a \$10 fee (the median value) would raise \$300,000 annually.

Visitors were also WTP \$12 per visit for sewage treatment to improve water quality. If fees were set at \$7 (the median value), results suggest \$210,000 could be raised annually.

Additionally, increases in fees for divers and snorkelers could raise \$363,000 each year for species conservation, as visitors would pay \$3.10-3.60 per additional viewing per trip. Habitat protection was worth \$3.24-3.70 per improvement per trip for 25% increases in coral cover, fish diversity and biodiversity, which could raise \$378,000 annually. Respondents would pay a mean of \$4.71 per trip for highly educated guides, which could result in \$174,000 of funding annually. Respondents also valued diving inside MPAs highly, being WTP an additional \$4.31 per trip, which could be used to raise \$160,000 annually for the park budget. Values placed on environmental features were higher than those for reduced crowding.

Respondents indicated that limiting the extent of coastal development, to preserve the natural quality of the landscape, could result in 50,000 additional trips to this area (a mean of 1.5 extra trips per person). Given typical spending, this could have a local economic impact of \$155 million

## CONCLUSIONS

The ecosystems, species and landscapes of the Exuma Cays represent a huge ecological and economic endowment for the people of the Exumas, The Bahamas and the wider Caribbean region. The services identified in this report and the values estimated, need to be incorporated into decision-making, including development planning and government policies. They can also be useful as tools to make a case for protection, to find sources of funding for conservation and inform compensation payments for environmental damage. Fortunately, the Exuma Cays has the opportunity to implement a number of measures in the next 5-10 years to protect their valuable environment from threats which could otherwise degrade its ecosystem services. Since budgets and stakeholder support are limited and the costs can be considerable, the trade-offs inherent in each potential project need to be fully considered.

For further information or for the full report, please contact me at: [vhargreavesallen@gmail.com](mailto:vhargreavesallen@gmail.com)