DAVID O. OBURA, Ph.D.

Coral Reefs
Climate Resilience/Adaptation - Evolution/biogeography
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Coastal Oceans Research and Development in the Indian Ocean (CORDIO East Africa) P.O.BOX 10135, Mombasa 80101, Kenya Tel: +254-715 067417 dobura@cordioea.org; www.cordioea.org Nationality: Kenya

Research and professional focal areas

Ecology and climate

Coral life history strategies, ecological resilience and climate change impacts. My research focuses on coral bleaching responses and long-term recovery dynamics, the role and assessment of ecological resilience, and how ecological systems respond and adapt to a changing climate. A growing focus is to use this knowledge to predict hazards related to short term climate variability and build adaptive capacity to possible climatic changes that affect vulnerable ecosystems and the people that depend on them.

Evolution and biogeography

Understanding the evolution and maintenance of coral reef biogeographic patterns in the western Indian Ocean, as a basis for regional scale planning for marine conservation and sustainable use of marine natural resources.

Livelihoods and adaptation

Through support to and coordination of projects focused on fishing communities on coral reefs, my objectives are to understand how users perceive their environment and make decisions, in order to foster more sustainable practices and improve peoples' welfare. The approach focuses on understanding people-environment interdependencies, building capacity for participatory monitoring, research and management to empower people in decision-making, and working towards strategies for adaptation of livelihoods to climate change.

Building capacity

Through networking, communication, publication and capacity building in science to build capacity to identify solutions to environmental problems, and through engaging in stakeholder, policy and management circles, to put solutions into practice.

For people dependent on natural resources, to develop opportunities for further education to empower them to independently improve their livelihood security, and take advantage productively of opportunities offered in their wider socio-economic and political setting.

Coral reefs are a highly vulnerable ecosystem that provides a model system to understand how people and the environment interact and affect one another, that can help predict dynamics in other, less vulnerable ecosystems. Increasingly, natural systems are becoming so altered, that maintaining the necessary ecosystem resilience and services that support human society is becoming an increasingly urgent imperative.

Current roles and responsibilities

CORDIO

1999 to date. Founding Director of CORDIO East Africa. Activities include primary research, monitoring and coordinating partners in studies on the implications of coral bleaching and mortality on coral reef biophysical and socio-economic parameters, fundraising and capacity building for coral reef science in the Western Indian Ocean.

IUCN

International Union for the Conservation of Nature:

Commissions – Chair, Coral Specialist Group, Species Survival Commission. 2008 to present.

Programme – Chair, Working Group on Climate Change and Coral Reefs. Global Marine Programme. 2006 to present.

East Africa Marine programme – partner and contributing member, 1999 to present.
 Membership – CORDIO East Africa is a member since 2008.

Phoenix Islands Protected Area (PIPA) Kiribati 2000 ongoing, as a Senior Research Associate, Global Marine Programs, New England Aquarium, USA. Chief scientist on coral reef and marine biodiversity surveys of the Phoenix Islands leading to designation of the 2nd largest MPA and largest World Heritage site in the world, and endowment funding for conservation. Project leader, Dr. Gregory Stone, Conservation International, USA. Hosted by Phoenix Islands Steering Committee/Ministry of Environment Lands and Agricultural Development, Government of Kiribati, and New England Aquarium, USA.

Kwetu Kenya Kwetu Training Center for Sustainable Development, Mtwapa, Kenya. Board member since 2000, Chairman of the Board since 2007. A non-profit-making NGO providing training and applied research on sustainable livelihoods in rural coastal areas.

Main projects (2011)

Coral reef resilience assessment Principal investigator and project leader, advice to management partners and NGO/INGOs, CORDIO and IUCN-CCCR. Core biodiversity region for the Principal investigator, CORDIO, and advisor for regional seascape Western Indian Ocean planning, Conservation International. Regional coral species Principal investigator and project leader, IUCN-CSG, CORDIO, in partnership with Zoological Society of London. conservation strategies Coral bleaching alerts for the Principal investigator, CORDIO, in partnership with University of Cape Western Indian Ocean Town and Kenya Meteorology Department. Principal investigator, CORDIO, in partnership with IUCN East and

Social vulnerability to short term climate hazards

Ecosystem Services for Poverty
Alleviation

Southern Africa Regional Office

Partner, CORDIO, with York University/Stockholm Environment Institute, and Plymouth Marine Laboratories (UK)

Alleviation	and Plymouth Marine Laboratories (UK)
Experience	
Academic	<u>Doctor of Philosophy (Ph.D.)</u> , <u>Univ. of Miami</u> , USA, 1995. Division of Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science (RSMAS). Dissertation title: Environmental Stress and Life History Strategies, a Case Study of Corals and River Sediment in Malindi, Kenya. Advisor: Dr. Peter W. Glynn.
	<u>Bachelor of Arts (B.A.) with Honours, Harvard University, USA, 1989.</u> Biology Department. Thesis
	with Highest Honours.
	International Baccalaureate (Distinction). Lester B. Pearson United World College of the Pacific. 1983-85. CIDA fellowship.
Personal	2007. Fellow of the Western Indian Ocean Marine Science Association.
Grants/Awards	2002-05. Rockefeller Foundation. Africa Career Award.
	2001-03. National Fish and Wildlife Foundation, Coral Reef Research grant.
	1999-2001. Rockefeller Foundation. Africa Career Award.
	1997-98. MacArthur Foundation/American Association for the Advancement of Science, USA.
	1997-98. National Geographic Society Committee on Research and Exploration. Conservation
	Ecology and Health of Corals in Kenya, Indian Ocean.
	1992-94. Rockefeller Foundation. Africa Dissertation Internship Award. PhD research.
Institutional/	2010-12. Adapting to climate change – coping with short term climate variability through seasonal
collaborative	prediction and social resilience. CORDIO, Kenya Meteorological Dept and University of Cape
Grants	Town. Funded by WIOMSA Marine Science for Management programme
	2008-10. Is there an Indian Ocean 'coral triangle'? CORDIO, University of Cape Town and South
	African Environmental Observation Network. Funded by WIOMSA MASMA.
	2006-8. IUCN Working Group on Climate Change and Coral Reefs. IUCN US and Global Marine Programme. 2 grants, Funded by Macarthur Foundation.
	2005-06. CORDIO East Africa – Socio-economic monitoring programme. NOAA Coral Reef Conservation Grants, USA.
	2005. CORDIO East Africa – Socio-economic monitoring programme. International Coral Reef Initiative/ICRAN/UNEP.
	2005-06, 2004. Phoenix Islands Conservation Project, Planning Grant (New England Aquarium).
	Global Conservation Fund, USA.
	2005. CORDIO East Africa Information Communication Technologies, Sida, Sweden.
	2001-02. CORDIO East Africa. Finnish Foreign Ministry, Finland.
	1999-2000; 2001-03; 2004-06. CORDIO programme. Sida/SAREC, Sweden
Links	State of the Environment, Coast, Kenya 2006-7 – member of core team.
	IPCC 2006 – expert reviewer - WGII Fourth Assessment report
	GEO-4 2006 – peer reviewer – Global Environment Outlook report.
	International Foundation for Science (IFS) – application reviewer.
	Research Council, Sweden (FORMAS) – application reviewer.
Climate change	March 2010. Expedition leader – Conservation International Marine Rapid Assessment and
	Climate resilience study of northeastern Madagascar. Conservation International.
	December 2009. Climate change vulnerability surveys of the Nosy Hara marine park,

	northwestern Madagascar. WWF Madagascar. January 2008. Madagascar national vulnerability assessment for marine and terrestrial biodiversity. WWF-US and Conservation International, funded by Macarthur Foundation. November 2006. IUCN Delegation to 12th Conference of Parties of the United Nations Framework Convention on Climate Change. Nairobi, Kenya. June 2006. Impacts of climate change on marine ecosystems and fisheries. Global Symposium for Africa 2006. Conservation International. Tananarive, Madagascar April 2006. Climate change impacts on African tropical marine biodiversity – GBIF conference, Cape Town, South Africa. October 2005. Climate change impacts on tropical marine biodiversity - current trends and potential scenarios for scleractinian corals and symbiotic zooxanthellae. Climate Change & Biodiversity in Africa. Royal Society/Natural History Museum/South African National Biodiversity Institute. October 2003. Resilience, coral bleaching and MPA design. Plenary address, WIOMSA Third Scientific Symposium, 15th - 18th October 2003. Maputo, Mozambique October 2003. World Parks Congress, IUCN, Durban, South Africa. Two Sessions: 1) Adaptive responses for nature conservation to climate change. Workshop Stream: Linkages in the Landscape; 2) Building protection of bleaching resistant sites into MPA networks. Session: The Next 20 Years and Beyond: Incorporating Resilience into MPA Design and Management.
Surveys/ expeditions (selected)	 2010. Tara Oceans, coral reef resilience scientist – Djibouti, St. Brandons (Mauritius), Mayotte. 2009 April. Southern Line Islands, Kiribati. Invited expert, National Geographic Society. February. Farquhar atoll, resilience assessment. National Geographic Society. 2008 May. Saudi Arabian Red Sea. Living Oceans Foundation. March/April. Seychelles resilience assessments. Aldabra atoll, Amirantes group. IUCN/ICS/ 2006 February. Chagos Archipelago, Indian Ocean 2000,02,05,09. Phoenix Islands, Kiribati. New England Aquarium. Kiribati. 1998-2006, annual. Kiunga Marine Reserve, Kenya. 2005. Northern Line Islands, Kiribati/USA. Invited expert, Scripps Institution of Oceanography. Mayotte, GIS/Lag-May expedition to western barrier. Seychelles - Tsunami impact assessment, UNEP/IUCN/CORDIO.
Environmental Appraisals/Impact Assessments	 2007-10. East Africa Submarine Cable project (EASSy), TEAMS and LION2 submarine cable projects, Telkom Kenya. 1999. Baseline Ecological surveys and EIA of TIOMIN Resources Inc., Kenya. Coast Environment Services, South Africa 1997. Mombasa Wastewater Ocean Outfall–Environmental Assessment. World Bank. 1994–95. Rapid Biodiversity Resource Appraisal, Canberra. World Bank–GEF\AusAID.
Geographic	Indian Ocean – Kenya, Mozambique, Tanzania, Seychelles, Comoros, Mayotte, Madagascar, St. Brandons, Chagos. Red Sea/Gulf of Aden – Saudi Arabia, Djibouti, Somaliland. Pacific Ocean – Phoenix Islands, Line Islands, Fiji, Galapagos. Caribbean – Jamaica, Florida.
Languages	English (fluent); French (working); Swahili, Spanish (basic)

Past positions

2006-2009. Adjunct Senior Lecturer, Faculty of Biological and Chemical Sciences (Centre for Marine Studies), University of Queensland. Brisbane, Australia.

2005-2009. World Bank-GEF – Coral Reef Targeted Research and Capacity Building project. Member of the Bleaching Working Group.

November 2005 ongoing. WWF US/Tanzania. Project: Coastal Resilience to Climate Change: Developing a Generalizable Method for Assessing Vulnerability and Adaptation of Mangroves and Associated Ecosystems. Climate vulnerability and coral reef consultant.

1997–98. Research Fellow, Coral Reef Conservation Program, Mombasa, Kenya 1995–96. Senior Conservation Associate, New England Aquarium, Boston, USA

Publications

- Obura, DO, Mangubhai S (2011) Coral mortality associated with thermal fluctuations in the Phoenix Islands, 2002–2005. Coral Reefs. DOI 10.1007/s00338-011-0741-7
- 2. Obura, D.O. (2010). Hawksbill turtles as significant predators on hard coral. Coral Reefs 29:759. DOI 10.1007/s00338-010-0611-8
- LaJeunesse TC, Pettay DT, Sampayo ES, Phongsuwan NP, Brown B, Obura DO, Hoegh-Guldberg O and Fitt WK. 2010) Long-standing environmental conditions, geographic isolation and host–symbiont specificity influence the relative ecological dominance and genetic diversification of coral endosymbionts in the genus Symbiodinium. J. Biogeography. doi:10.1111/j.1365-2699.2010.02273.x
- Barott KL, Caselle JE, Dinsdale EA, Friedlander AM, Maragos JE, et al. (2010) The Lagoon at Caroline/Millennium Atoll, Republic of Kiribati: Natural History of a Nearly Pristine Ecosystem. PLoS ONE 5(6): e10950. doi:10.1371/journal.pone.0010950
- Munga CN, Mohamed MOS, Obura DO, Van Reusel A & Dahdouh-Guebas F (2010) Resource Users' Perceptions on Continued Existence of the Mombasa Marine Park and Reserve, Kenya. Western Indian Ocean J. Mar. Sci.. 9: 213-225
- Montano, S, Seveso, D, Galli, P & Obura, D.O. (2010) Assessing coral bleaching and recovery with a colour reference card in Watamu Marine Park, Kenya. Hydrobiologia 655:99–108 DOI 10.1007/s10750-010-0407-4
- Veron, J.E.N., O. Hoegh-Guldberg, T.M. Lenton, J.M. Lough, D.O. Obura, P. Pearce-Kelly, C.R.C. Sheppard, M. Spalding, M.G. Stafford-Smith, A.D. Rogers (2009) The coral reef crisis: The critical importance of <350 ppm CO2. Marine Pollution Bulletin 58 (2009) 1428–1436. doi:10.1016/j.marpolbul.2009.09.009
- Obura, D.O. (2009) Bleaching as a life history trait in coral-zooxanthellae holobionts – relevance to acclimatization and adaptation. Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008
- Obura, DO. (2009) Corals bleach to resist stress. Marine Pollution Bulletin 58:206-212. DOI 10.1016/j.marpolbul.2008.10.002
- Masumoto Y., W. Yu, G. Meyers, N. D'Adamo, L. Beal, W. P. M. de Ruijter, M. Dyoulgerov, J. Hermes, T. Lee, J. R. E. Lutjeharms, J. P. McCreary, Jr., M. J. McPhaden, V. S. N. Murty, D. Obura, C. B. Pattiaratchi, M. Ravichandran, C. Reason, F. Syamsudin, G. Vecchi, J. Vialard, L. Yu (2009) Observing Systems In The Indian Ocean. IndOOS http://www.jamstec.go.jp/frsgc/research/d/iod/cvrp_symp/masumoto.pdf
- Carpenter, K.E & 39 co-authors incl. Obura, D.O. 2008. One-Third of Reef-Building Corals Face Elevated Extinction Risk from Climate Change and Local Impacts. Science 321: 560-563
- Stuart A. Sandin, Jennifer E. Smith, Edward E. DeMartini, Elizabeth A. Dinsdale, Simon D. Donner, Alan M. Friedlander, Talina Konotchick, Machel Malay, James E. Maragos, David Obura, Olga Pantos, Gustav

- Paulay, Morgan Richie, Forest Rohwer, Robert E. Schroeder, Sheila Walsh, Jeremy B.C. Jackson, Nancy Knowlton, Enric Sala. 2008. Degradation of coral reef communities across a gradient of recent human disturbance. PLoS ONE.
- Mangubhai, S., Harrison, P.L. & Obura, D.O. 2007 Patterns of coral larval settlement on lagoon reefs in the Mombasa Marine National Park and Reserve, Kenya. Mar Ecol Prog Ser 348: 149–159. doi: 10.3354/meps07090
- 14. Laurence J McCook, Carl Folke, Terry Hughes, Magnus Nystro m, David Obura and Rod Salm. 2007. Chapter 4 Ecological resilience, climate change and the Great Barrier Reef: an introduction. In: Johanna Johnson & Paul Marshall (eds). Climate change and the Great Barrier Reef. A Vulnerability Assessment. GBRMPA. Great Barrier Reef Marine Park Authority and Australian Greenhouse Office, Australia
- David Obura, Yao-Yang Chuang, Mike Olendo, Nassir Amiyo, Julie Church, and Chaolun Allen Chen. 2007. Relict Siderastrea savignyana(Scleractinia: Siderastreidae) in the Kiunga Marine National Reserve, Kenya. Zoological Studies.
- Visram S., Mwaura J. and Obura D.O. 2007. Assessing Coral Community Recovery from Coral Bleaching by Recruitment in Two Reserves in Kenya. Western Indian Ocean J. Mar. Sci. 6:199–205
- Obura, D.O., Causey, B., Church, J.C.(2006) Management response to a bleaching event. In: Corals and Climate Change. (Eds) Jonathan Phinney (managing editor), Ove Hoegh-Guldberg, Joanie Kleypas, William Skirving, Al Strong. American Geophysical Union.
- 18. Obura, D.O. (2006). Impacts of the 26 December 2004 tsunami in Eastern Africa. Ocean and Coastal Management. 49:873-888
- Smith JE, Shaw M, Edwards, RA, Obura, D, Pantos, O, Sala, E,. Sandin,SA, Smriga, S, Hatay, M and Rohwer, FL I. (2006) Indirect effects of algae on coral: algae-mediated, microbeinduced coral mortality. Ecology Letters 9, doi: 10.1111/j.1461-0248.2006.00937.x.
- Obura, D.O. (2005). Resilience and climate change: lessons from coral reefs and bleaching in the Western Indian Ocean. Estuarine Coastal and Shelf Science. 603:353-372
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- Obura, D, Souter, D, Linden, O, Wilhelmsson, D, Payet, R (2005) Cosmoledo Atoll in the Aldabra group of southern Seychelles: status and management prospects in a changing world. Proceedings of the 10th International Coral Reef Symposium
- Obura, D, Mbije, N, Church, J, Ngowo, R, King, A, Nur, M (2005) Ecological Status of Coral Reefs of Mnazi Bay And Ruvuma Estuary. Proceedings of the 10th International Coral Reef Symposium
- Church, J.C., Obura, D.O. (2005) Sustaining coral reef ecosystems and their fisheries in the Kiunga Marine National Reserve, Lamu Kenya. Proc. 10th International Coral Reef Symposium, Okinawa.
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- 26. Payet, R.A., Obura, D.O. (2004). The negative impacts of Human Activities in the Eastern African Region? An International Waters Perspective. Ambio 33:24-34.
- 27. Kimani, PE, Obura, DO. (2004) Participatory mapping of terrestrial fishery resources. Western Indian Ocean Journal of Marine Science. 3(2): 209–220
- Obura, D.O., Wells, S., Church, J., Horrill, C. (2002) Monitoring of fish and fish catches by local fishermen in Kenya and Tanzania. Marine and Freshwater Research 53(2) 215-222
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- Obura, D.O. (2001). Participatory Monitoring Of Shallow Tropical Marine Fisheries By Artisanal Fishers In Diani, Kenya. Bulletin of Marine Science. Bulletin of Marine Science. 69:777-792.
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- 34. McClanahan, T., R, Obura, D., O,Uku, J., N, & Machano, H. (1999). Is the restoration of algal dominated coral reefs possible? Ecological Applications
- McClanahan,TR and Obura,DO. 1997. Sedimentation effects on shallow coral communities in Kenya. Journal of Exp. Mar. Biol Ecol. 209:103-122.
- McClanahan,TR and Obura,DO. (1996). Coral Reefs. In: Ecosystems of Eastern Africa. Blackwell. Nairobi. pp. 67-100.
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- 38. McClanahan,TR and Obura,DO. 1995. The status of Coral Reefs in Kenya. Coastal Management 23:57-76.

Books

- Obura, D.O., Tamelander, J., & Linden, O. (Eds) (2008)
 Ten years after bleaching facing the consequences of
 climate change in the Indian Ocean. CORDIO Status
 Report 2007. CORDIO (Coastal Oceans Research and
 Development, Indian Ocean)/Sida-SAREC. Mombasa.
 http://:www.cordio.org. 430 pp.
- Obura, D, Payet, R. & Tamelander, J. (Eds.) (2003). Proceedings of the International Coral Reef Initiatve (ICRI) Regional Workshop for the Indian Ocean, 2001. ICRI/UNEP/ICRAN/CORDIO. 180pp.
- Linden, O., Souter, D., Wilhelmsson, D., Obura, D.O., (Eds.) (2002). Coral Reef Degradation In The India Ocean. Status reports 2002. CORDIO/SAREC Marine Science Program.

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In press/review

- Obura, DO, Stone, G, Mangubhai, S, Bailey, S, Yoshinaga, A, Holloway, C, Barrel, R. Baseline marine biological surveys of the Phoenix Islands, July 2000. Atoll Research Bulletin.
- 45. Obura, DO. Coral reef structure and zonation of the Phoenix Islands. Atoll Research Bulletin.
- 46. Obura, DO, Mangubhai, S, Yoshinaga, A. Sea turtles of the Phoenix Islands, 2000-2002. Atoll Research Bulletin.
- 47. Wegley LK, KL Barott, E Dinsdale, AM Friedlander, B Nosrat1, DO Obura, E Sala, SA Sandin, JE Smith, MJA Vermeij, GJ Williams, D Willner, & F Rohwer (in review) Iron induced phase-shifts on coral reefs. ISME journal

Survey methodologies

- 48. Marshall N.A., Marshall P.A., Tamelander J., Obura D., Malleret-King D. and Cinner J.E. 2009. A Framework for Social Adaptation to Climate Change: Sustaining Tropical Coastal Communities and Industries. IUCN, Gland, Switzerland, ISBN:978-2-8317-1200-0
- Obura, D.O. and Grimsdith, G. (2009). Resilience Assessment of coral reefs – Assessment protocol for coral reefs, focusing on coral bleaching and thermal stress. IUCN working group on Climate Change and Coral Reefs. IUCN, Gland, Switzerland. www.iucn.org/cccr/publications. 70 pages. ISBN: 978-2-8317-1151-5
- ICRI/ISRS (2005) Tsunami Damage to Coral Reefs. Guidelines for Rapid Assessment and Monitoring. Victoria, Seychelles. International Coral Reef Initiative/International Society for Reef Studies (30)

Other (miscellaneous)

- Oluoch, S. J., D. Obura & A. Hussein 2009. The capacity of fisherfolk to implement beach management units in Diani-Chale. In: Advances in Coastal Ecology - People, processes and ecosystems in Kenya. Eds. Jan Hoorweg & Nyawira Muthiga. African Studies Centre; African Studies Collection, vol. 20. ISBN: 978-90-5448-090-7. Pp. 99-109
- Obura, D, Tamelander, J, Samoilys, M. 2006. Linking science and management for adaptation: lessons from coral bleaching and climate change. IUCN exhibit to the 12th COP of the United Nations Framework Convention on Climate Change (UNFCCC). 6-17 November 2006, Nairobi.
- Obura, DO. 2006. Management During Mass Coral Bleaching Events. Theme: Building Resilience into Coral Reef Management. Third International Tropical Marine Ecosystems Management Symposium, 16-21 October 2006. Cozumel Mexico.
- Church, JE, Obura, DO. 2004 Management recommendations for the Kiunga Marine National Reserve, based on coral reef and fisheries catch surveys, 1998 – 2003. CORDIO/WWF KMNR, Lamu, Kenya.
- Obura, DO. 2002. When El Niño strikes again. Ecoforum, Hot Season 2002. pp 29-31

Plus over 80 other references and reports.