Marine & Coastal Resource Systems (EA2134 // @marcoresys2016)

Module Overview:

This module examines marine and coastal environments in which human activities (infrastructural development, hazard mitigation, resource extraction) and natural processes (physical landscape change, ecosystem functioning, resource condition) interact over time. These resource systems are contexts in which human activities and natural processes are dynamically linked, such that the state and behaviour of each is a function of the other.

Session Schedule & Readings

Class Meeting	**Topic**	**Readings**
12 Jan	Introduction – nuts & bolts, mutual contract, trailer of things to come	--
19 Jan	Nauru, sustainability, and resilience	Gowdy & McDaniel (1999); Reyes (1996); Kates et al. (2001); Holling (1973); Beisner et al. (2003)
26 Jan	Fisheries – roving bandits, extinction types, and the anthropogenic Allee Effect	Berkes et al. (2006); Pauly et al. (2002); McCauley et al. (2015); Courchamp et al. (2006)
2 Feb	Beach nourishment – from the US to the Netherlands – and the case for seawalls	Lazarus et al. (2015); Kabat et al. (2009); Hapke et al. (2013); Hinkel et al. (2014); Ma et al. (2014)
9 Feb	Dynamics of risk & "building with nature"	NRC (2014); Giosan et al. (2014); Temmerman et al. (2014); Temmerman & Kirwan (2015)
16 Feb	Coupled systems I – intro, Florida, Jevons' paradox	Werner & McNamara (2007); [*Lazarus et al. (2015) – see 2 Feb*]; Armstrong et al. (submitted); Sorrell (2009); Owen (2010)
23 Feb	Coupled systems II – tourist area cycle & limits to growth?	Butler (1980); McNamara & Werner (2008); Dunning et al. (2012)
1 Mar	Common-pool resources I – fisheries revisited	Dietz et al. (2003); Ames (2004); Wilkinson (2006); St Martin & Hall-Arber (2008); Steneck et al. (2011); Boonstra & de Boer (2013)
8 Mar	Common-pool resources II – shoreline dynamics & sand scarcity	Nordstrom (1994); Stone (2000); UNEP (2014); Gillis (2014)
15 Mar	Synthesis – sustainability & resilience revisited (and the resource curse?)	Miller et al. (2010); Sachs & Warner (2001)

MODULE READINGS (by session topic):

Note that the readings listed here may be supplemented with web links, additional titles, and other media and/or resources during the term. These supplemental materials will be available on Learning Central, organised according to session topic.

Nauru, sustainability, and resilience:

- Holling, C.S. (1973) Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 4, 1–23

- Reyes Jr, R.E. (1996) Nauru v. Australia: The International Fiduciary Duty and the Settlement of Nauru's Claims for Rehabilitation of Its Phosphate Lands. *NYL Sch. J. Int'l & Comp. L.*, 16

- Gowdy, J.M., McDaniel, C.N. (1999) The physical destruction of Nauru: an example of weak sustainability. *Land Economics* 75, 333–338

- Kates, R.W., *et al.* (2001) Sustainability science. *Science* 292, 641–642

- Beisner, B.E., Haydon, D.T., Cuddington, K. (2003) Alternative stable states in ecology. *Frontiers in Ecology and the Environment* 1, 376–382

Fisheries – roving bandits, extinction types, and the anthropogenic Allee Effect:

- Pauly, D., *et al.* (2002) Towards sustainability in world fisheries. *Nature* 418, 689–695

- Berkes, F., *et al.* (2006) Globalization, roving bandits, and marine resources. *Science* 311, 1557–1558

- Courchamp, F., *et al.* (2006) Rarity value and species extinction: the anthropogenic Allee effect, *PLoS Biology* 4, e415, doi:10.1371/journal.pbio.0040415

- McCauley, D.J., *et al.* (2015) Marine defaunation: Animal loss in the global ocean. *Science* 347, 1255641

Beach nourishment and the case for seawalls:

- Kabat, P., *et al.* (2009) Dutch coasts in transition. *Nature Geoscience* 2, 450–452

- Hapke, C.J., Kratzmann, M.G., Himmelstoss, E.A. (2013) Geomorphic and human influence on large-scale coastal change. *Geomorphology* 199, 160–170
- Hinkel, J., *et al.* (2014) Coastal flood damage and adaptation costs under 21st century sea-level rise. *Proceedings of the National Academy of Sciences* 111, 3292–3297

- Ma, Z., *et al.* (2014) Rethinking China's new great wall. *Science* 346, 912–914

– Lazarus, E.D., *et al.* (2015) An evolving research agenda for human–coastal systems, *Geomorphology*, doi:10.1016/j.geomorph.2015.07.043

Dynamics of risk & "building with nature":

– Temmerman, S., et al. (2013) Ecosystem-based coastal defence in the face of global change. *Nature* 504, 79–83

– NRC (National Research Council) (2014) *Reducing coastal risk on the East and Gulf Coasts*. National Academies Press, Washington, DC (208 pp)

– Giosan, L., Syvitski, J., Constantinescu, S., Day, J. (2014) Climate change: protect the world's deltas. *Nature* 516, 31–33

– Temmerman, S. and Kirwan, M.L. (2015) Building land with a rising sea. *Science* 349, 588–589

Coupled systems I – introduction, Florida, Jevons' paradox:

– Werner, B.T., McNamara, D.E. (2007) Dynamics of coupled human-landscape systems. *Geomorphology* 91, 393–407

– Sorrell, S. (2009) Jevons' Paradox revisited: The evidence for backfire from improved energy efficiency. *Energy Policy* 37, 1456–1469

– Owen, D. (2010) The efficiency dilemma. *The New Yorker* 86

– Armstrong, S.B., *et al.* (submitted) Intensified coastal development behind nourished beaches

– […and revisit *Lazarus et al. (2015) – see 2 Feb reading*]

Coupled systems II – tourist area cycle & limits to growth?

– Butler, R.W. (1980) The concept of a tourist area cycle of evolution: implications for management of resources. The Canadian Geographer 24, 5–12

– McNamara, D.E., Werner, B.T. (2008) Coupled barrier island–resort model: 1. Emergent instabilities induced by strong human‐landscape interactions. *Journal of Geophysical Research –Earth Surface 113*(F1)

– Dunning, N.P., Beach, T.P., Luzzadder-Beach, S. (2012) Kax and kol: Collapse and resilience in lowland Maya civilization. *Proceedings of the National Academy of Sciences* 109, 3652–3657

Common-pool resources I – fisheries revisited:

– Hardin, G. (1968) The tragedy of the commons. *Science* 162, 1243–1248

– Dietz, T., *et al.* (2003) The struggle to govern the commons. *Science* 302, 1907–1912

– Ames, E. (2004) Atlantic cod stock structure in the Gulf of Maine. *Fisheries* 29, 10–28

– Wilkinson, A. (2005), The lobsterman. *The New Yorker* 31

– St Martin, K., Hall-Arber M. (2008) The missing layer: Geo-technologies, communities, and implications for marine spatial planning. *Marine Policy* 32, 779–786

– Steneck, R.S., *et al.* (2011) Creation of a gilded trap by the high economic value of the Maine lobster fishery. *Conservation Biology* 25, 904–912

– Boonstra, W.J., de Boer, F.W. (2014) The historical dynamics of social–ecological traps. *Ambio* 43, 260–274

Common-pool resources II – shoreline dynamics & sand scarcity:

– Nordstrom, K. (1994) Beaches and dunes of human-altered coasts. *Progress in Physical Geography* 18, 497–516

– Stone, K.E. (2000) Sand rights: a legal system to protect the shores of the sea. *Stetson L. Rev.* 29, 709

– Gillis, J.R., Why sand is disappearing. The *New York Times*, 4 November 2014

– UNEP, Sand, rarer than one thinks. UNEP Global Environmental Alert Service, March 2014 (available online: http://www.unep.org/pdf/UNEP_GEAS_March_2014.pdf)

Synthesis – sustainability & resilience revisited (and the resource curse?)

– Sachs, J.D. and Warner, A.M. (2001) The curse of natural resources. *European Economic Review* 45, 827–838

– Miller, F., *et al.* (2010) Resilience and vulnerability: complementary or conflicting concepts? *Ecology and Society* 15.