# Fisheries Science for Policy and Management

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May 30-June 9, 2017

The course will provide students with practical insight into how science is translated into policy and management, particularly in the context of Latin America. Lectures, discussion, and analytical exercises will explore what is required for fisheries science and policy to be effective. The course emphasizes the interdisciplinary nature of policy instruments, institutional arrangements, science diffusion, participatory monitoring, governance, co-management, and socio-economic considerations. Students will have opportunities to engage actual data from real fisheries, gaining familiarity with the complete process leading to decision-making in fisheries management and resource conservation.

We will discuss which are key elements to increase effectiveness of policy implementation. LAFF students will pick their favorite, real example, either from back home or any example of a fishery well known to her/him. She/he will conduct research beforehand and have a clear idea as to which basic biology, ecology, economics, social, or governance aspects need to be considered and what kind of assessment options and management instruments are best suited for their fishery of interest. Students will frame their case study in a formal logical manner, and in group discussions we will test assumptions, identify uncertainties, management options and policy instruments available. We will identify factors which may expedite implementation as well as those that will have to be taken into consideration for increased likelihood of success.

We will briefly touch upon models available, how to introduce environmental forcing, and parameter fitting techniques and tricks. We will stress that nothing substitutes observation, a body of sound theoretical background, and logical reasoning. Therefore, from the onset we will review logic in science emphasizing strong inference, as well as inductive reasoning. We will review a suite of alternatives for the frequent case when we need to provide management advice for fisheries where information and data are scarce.

NOTE: LAFF students attending the course will previously identify policies, tools and instruments available in a specific LA country, and of administrative/legislation pieces pertinent to design and implement fisheries management. For this task, students are encouraged to form at least four teams and choose a LA country per team.

## Program

Day 1: Tuesday, May 30th. A) Course roadmap: assignments, attendance, teams, grading. B) Inductive and deductive reasoning. Review of models: from Russell's axiom to age/size structured models with stock-recruitment, uncertainty and environmental forcing.

Suggested readings

Anderson, L.G. and J.C. Seijo. 2010. Bioeconomics of Fisheries Management. Wiley-Blackwell, NJ 305 pp. Ch.2

Harlow, L.L. 2010. On Scientific Research: The Role of Statistical Modeling and Hypothesis Testing, Journal of Modern Applied Statistical Methods 9 (2): 348-358.

Quinn, J.F. and A.E. Dunham. 1982. On hypothesis testing in ecology and evolution. The American Naturalist 122(5): 602-617.

O'Connor et al. 2015. Strengthening confidence in climate change impact science. Global Ecology and Biogeography 24: 64-76.

Snijders, T.A.B. 2002. Hypothesis Testing: Methodology and Limitations. In N.J. Smelser & P. B. Baltes (eds.) International Encyclopedia of the Social and Behavioral Sciences 10: 7121 - 7127.

Day 2. Wednesday, May 31st. A) The logics and role of models in ecology, fisheries management and natural resource conservation. B) Basic fisheries concepts, models and reference points for management.

Suggested readings

Caddy, J.F. and R. Mahon. 1995. Reference points for fisheries management. FAO Fisheries Technical Paper. No. 347. Rome 83 pp. Ch. 1 and Ch. 2.

Cope, J.M. and A.E. Punt. 2009. Length-Based Reference Points for Data-Limited Situations: Applications and Restrictions. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 1:169-186.

Froese, R. 2004. Keep it simple: three indicators to deal with overfishing. Fish and Fisheries 5: 529 86-91.

Heino et al. 2013. Can fisheries-induced evolution shift reference points for fisheries management? ICES Journal of Marine Science 70(4): 707-721.

Day 3. Friday, June 2nd. A) Conforming a body of theory: from monitoring and socio-economic surveying to model to management scenarios. Key question: how can one identify key challenges, causes and solutions (i.e., review of strategic planning applied to fisheries management). B) Preparation for case studies: a couple examples to serve as guidelines. C) General discussion focusing on basic known/unknown species biology and ecology, socio-economic setting, market, input/output controls, governance, to propose policies, strategies and tools and, if possible, management plan.

Supporting readings

Government of Western Australia. Department of Fisheries. Strategic Plan 2016-2020. Available at: http://www.fish.wa.gov.au/Documents/corporate_publications/strategic_plan_2016-2020.pdf

Kingdom of Cambodia. N/D. The Strategic Planning Framework for Fisheries: 2010-2019. Available at: http://extwprlegs1.fao.org/docs/pdf/cam143042.pdf

Northwest Fisheries Science Center Strategic Science Plan. July 2013. Available at: https://www.st.nmfs.noaa.gov/Assets/Strategic-Plans/FINAL%20NWFSC%20Strategic%20Science%20Plan%202013%20(1).pdf

Day 4. Monday, June 5th. A) What to do in data-poor situations. B) Group discussion of LAFF students case studies: identifying commonalities and specificities.

Supporting readings (in addition of those provided in advance by LAFF students)

Chrysafi, A. and A. Kuparinen. 2016. Assessing abundance of populations with limited data: Lessons learned from data-poor fisheries stock assessment. Environ. Rev. 24: 1-14.

Edwards, C.T.T. 2015. Review of data-poor assessment methods in New Zealand fisheries. New Zealand Fisheries Assessment Report No. 2015/27. 24 pp.

Newman et al. 2014. Improving the Science and Management of Data-Limited Fisheries: An Evaluation of Current Methods and Recommended Approaches. NRDC Report. October 2014. R-14-09-B. 36 pp.

Newman, D., J. Berkson and L. Suatoni. 2015. Current methods for setting catch limits for data-limited fish stocks in the United States. Fisheries Research 164: 86-93.

Pilling et al. 2008. Assessment and management of data-poor fisheries. In Payne, Cotter and Potter (eds.) Advances in fisheries science: 50 years on from Beverton and Holt, pp. 280-305. Blackwell Publishing.

Zhou, S., S. Pascoe, N. Dowling, M. Haddon, N. Klaer, J. Larcombe, A.D.M. Smith, O. Thebaud, S. Vieira, and S. Wayte. 2013. Quantitatively defining biological and economic reference points in data poor fisheries. Final Report on FRDC Project 2010/044. Canberra, Australia.

Day 5. Wednesday, June 7th. More group discussions: identifying general challenges and their solutions.

Draft essays by LAFF students

Day 6. Friday, June 9th. A) Review of specific topics of interest identified by LAFF students. B) Concluding remarks and next steps.