

# Syllabus for Resilience and the study of social-ecological interactions PhD-level course (1.5 hp)

Sept 27-30, 2011

## Background reading

These readings are suggested for students who have little prior exposure to resilience literature. You should discuss with your supervisor the amount of background reading you need before the course. We expect that you will be conversant with most of the concepts used and discussed in the resilience literature. These concepts include: resilience, adaptive cycle, alternative stable states, regime shifts, slow and fast variables, feedbacks, ecosystem services, and complex adaptive systems.

These include: regime shifts, adaptive cycle, multiple stable states, ecological vs engineering resilience, slow and fast variables, feedbacks, ecosystem services, functional diversity and redundancy, complex adaptive systems (CAS), adaptive capacity, co-management/adaptive co-management.

Suggested background readings:

- Walker, B. and Salt, D. 2006. Resilience Thinking. Sustainable ecosystems and people in a changing world. Island Press.
- Navigating Social-Ecological Systems: Building resilience for complexity and change. Eds. Berkes, F., Colding, J., Folke, C. Cambridge University Press.
- Carpenter et al (2001) From metaphor to measurement. Resilience of what to what? *Ecosystems* 4(8):765-781
- Fischer, J. et. Al. (2009) Integrating resilience thinking and optimisation for conservation. *Trends in ecology & evolution*, **24**, 549-54.

Suggested background videos:

Marten Scheffer "Resilience Revisited" from Resilience 2011 conference  
<http://csid.asu.edu/resilience-2011/invited-speakers/videos/marten-scheffer/>

## Comparative approaches:

1) Ellis, E and Ramankutty, N. (2008) Putting people in the map: anthropogenic biomes of the world. *Frontiers in Ecology and the Environment* 6(8): 439–447.

2) Seixas, C.S. and Berkes, F. (2003) Dynamics of social-ecological changes in a lagoon fishery in southern Brazil. In: *Navigating Social-Ecological Systems: Building resilience for complexity and change*. Eds. Berkes, F., Colding, J., Folke, C. Cambridge University Press.

3) Turner et al. (2003) Illustrating the coupled human-environment system for vulnerability analysis: Three case studies. *PNAS* 100(14):8080-8085.

## Adaptive cycle:

1) Holling, C.S. (1986) The resilience of terrestrial ecosystems; local surprise and global change. Pages 292-317 in W.C. Clark and R.E. Munn, editors. Sustainable Development of the Biosphere. Cambridge University Press, Cambridge, U.K. (pdf supplied)

2) Gunderson, L., Holling, C.S. and Peterson, G. (2002) Surprises and Sustainability: Cycles of renewal in the Everglades (Ch 12). In: Panarchy. Understanding transformations in human and natural systems. Eds. Gunderson, L. and Holling, C.S. Island Press.

3) Van Apeldoorn, D. F., et al. (2011) Panarchy rules: rethinking resilience of agroecosystems, evidence from Dutch dairy-farming. *Ecology and Society* **16**(1): 39. [online] URL: <http://www.ecologyandsociety.org/vol16/iss1/art39/>

## Theory, method and applications to be used in the course

Concepts	Methods	Applications
Resilience and Social-Ecological systems Adaptive cycle	Cross-disciplinary case comparisons	Development of research questions and methodologies

The course stretches across four full days (see schedule below). Students are expected to use the day before each seminar to read and prepare a written assignment that will be examined and discussed in the following day's seminar.

### Course schedule:

Day	Duration	Activities	Assignments
Tuesday, Sept 27	Full day	Reading and preparation of written assignment	Written assignment
Wednesday, Sept 28	10.00-16.00	Discussion seminar small group and plenary	
Thursday, Sept 29	Full day	Reading and preparation of written assignment	Written assignment
Friday, Sept 30	10.00-16.00	Discussion seminar small group and plenary	

## Learning outcomes

Upon completion of this course students should:

1. Have a deeper understanding of the concepts of resilience and social-ecological systems and how they relate to and contrasts with other disciplinary approaches to understanding human-environment relations,
2. Explain in which contexts each different approach to studying human-environment relations are most commonly used, as well as their strengths and weaknesses,

3. Be able to demonstrate how to use the adaptive cycle to develop research questions,
4. Develop and describe the appropriate methodologies to address these research questions.

### Assessment and grading criteria

Relative grading weight	Type of assessment	Learning outcome		
		1	2	3
50%	Seminars	x	x	x
50%	Written assignments	x	x	x

Participation in all seminars is compulsory. Participation does not only mean attendance, the participant must take an active role in the seminar. Failure to attend a seminar will result in a grade of Fail.

#### Criteria for assessment:

The following grades are issued, the lower limits for each grade is expressed as a percentage of the maximum points available:

- P Pass – student shows proficiency in stipulated goals, and has full attendance  
 F Fail - Below 50% Poor or insufficient conduct

#### Course Outline

### PART I: SES, resilience and other scientific approaches to studying human-environment interactions

#### Day 1 (Sept 27): Preparation, independent work by students

In preparation for the seminar on Day2 all students will read the three papers assigned in the syllabus.

Each student will write a brief essay [1000 words] that examines the three approaches to studying social-ecological interactions represented by each paper and discuss and contrast them with regards to the following questions. You should address the questions:

1. How do they differ?
2. What are the contributions to social-ecological systems understanding of each approach?
3. What are the limitations?

They should bring a print out of their essay and bring it to class as well as email it to [garry.peterson@stockholmresilience.su.se](mailto:garry.peterson@stockholmresilience.su.se).

Students should also consider how these concepts relate to their own research.

#### Day 2 (Sept 28): Discussion Seminar

Location: Smartboard room, Stallet

Time 9.30-12.30; lunch; 1.30-4

Three discussion themes:

What is Resilience Theory?

What are Social-ecological systems?

How do social-ecological systems concepts relate to your own research?

### **Day 3 (Sept 29): Preparation**

Broadly this day aims explore how heuristic models and conceptual frameworks are used in and shape in resilience research.

In preparation for the seminar on Day 4 you should read the three papers on the adaptive cycle assigned in the syllabus, and reflect on the following two questions:

- What are the limitations of using the adaptive cycle as as a tool to describe a system?
- For each paper, reflect on the degree to which authors are using the adaptive cycle as an *analytical tool* or as a *heuristic model from which to develop hypotheses* for testing.

Furthermore, we would like to to write a brief essay (less than 1000 words) that reflects on how the adaptive cycle models could be used in your own research. We would like you to reflect on and discuss how this heuristic could be applied to your work.

Specifically in your essay you should:

- § Examine your system in terms of phases - illustrating important dynamic process which you believe influence your system.
- § For each phase, describe what is happening with the resilience of the system (define what you think resilience would mean in the context of your case) and why? What are the underlying dynamics?
- § Reflect on whether this has helped you understand something about your system – explain how, or why not.

You can include a figure if you wish, but it isn't needed.

They should bring a print out of their essay and bring it to class as well as email it to [garry.peterson@stockholmresilience.su.se](mailto:garry.peterson@stockholmresilience.su.se). Before 6pm on day 3 - so I can read it prior to seminar.

### **Day 4 (Sept 30): Discussion Seminar**

**Location: Smartboard room, Stallet**

Time 9.30-12.30; lunch; 1.30-4

Discussion themes:

1. How can the adaptive cycle be used?
2. What are the limitations of using the adaptive cycle of using it at as descriptive tool?
3. How do you apply the adaptive cycle to a case or a case comparison?
4. How do you use adaptive cycle as an analytical tool?
5. How do you use adaptive cycle to develop research questions?