



Deutsches Institut für Entwicklungspolitik German Development Institute



Modes & Logics of Inter- & Transdisciplinarity

Prof. Dr. Anna-Katharina Hornidge

UN Sustainable Development Agenda



Call for Science & science-based ,Solutions'

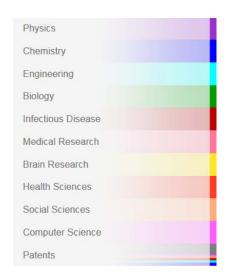


§13 (f) Dedicate greater resources to marine scientific research, such as interdisciplinary research and sustained ocean and coastal observation, as well as the collection and sharing of data and knowledge, including traditional knowledge, in order to increase our knowledge of the ocean, to better understand the relationship between climate and the health and productivity of the ocean, to strengthen the development of coordinated early warning systems on extreme weather events and phenomena, and to promote decision-making based on the best available science, to encourage scientific and technological innovation, as well as to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries;

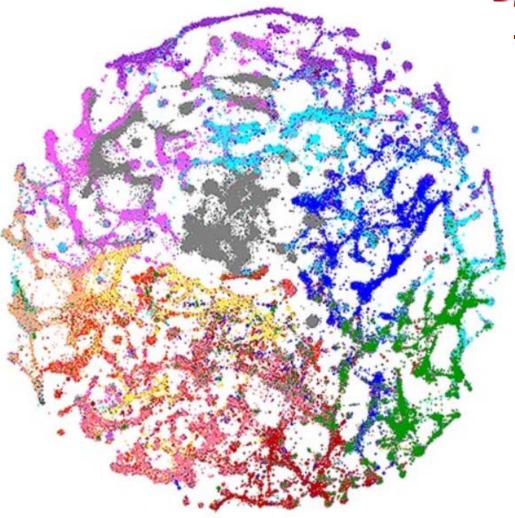
World of Science

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"The world has problems, the universities have departments." (Brewer, 1999)



1996-2011: 20 mio. scientific articles; 2 mio. patents



www.mapofscience.com

Challenges of Inter- & Transdisciplinarity



'Language'

• Different `languages' within and between disciplines and the world.

'Paradigms'

- Different cultures and frames of reference.
- Different methods, theoretical and operational objectives.

,Organisation and Incentives'

- Institutional impediments related to incentives, funding, and priorities given disciplinary, inter- & transdisciplinary work
- *Professional impediments* related to hiring, promotion, status, and recognition.

Brewer, 1999 & Hornidge et al. 2011

What Type of Science?

Ontology:

What exists?

Epistemology:

How do we know?

Motivation:

Why do we research?

Moon/Blackmann 2014

Realism: one reality exists Relativism: multiple realities exist 1.1 Naïve realism 1.2 Structural realism 1.3 Critical 1.4 Bounded relativism 1.5 Relativism Reality can be Reality is described by Mental constructions of reality are Realities exist as multiple, realism understood using scientific theory, but its Reality captured equal in space & time within intangible mental appropriate underlying nature remains by broad critical boundaries (e.g., cultural, moral, constructions; no reality uncertain cognitive) methods examination beyond subjects 2.0 EPISTEMOLOGY: How do we create knowledge? 2.1 Objectivism 2.2 Constructionism* 2.3 Subjectivism Meaning exists within an object: an objective Meaning created from interplay between the Meaning exists within the subject: reality exists in an object independent of the subject & object: subject constructs reality of subject imposes meaning on an object 3.0 THEORETICAL PERSPECTIVE: What is the philosophical orientation of the researcher that guides their action/research? Knowledge acquisition is deductive, 'value-free', generalizable

Knowledge acquisition is inductive, value-laden, contextually unique Application: to predict 3.1 Positivism Natural science methods (posit, observe, derive logical truths) can be applied to the social sciences 3.2 Post-positivism Multiple methods are necessary to identify a valid belief because all methods are imperfect 3.3 Structuralism The source of meaning comes from the formal structure found in language & can apply to all aspects of human culture Application: to understand 3.4 (Social) Constructivism Meaning making of reality is an activity of the individual mind 3.5 Interpretivism Natural science methods cannot apply to social science; interpretations of reality are culturally derived & historically situated 3.5a Hermeneutics 3.5c Symbolic interactionism 3.5b Phenomenology Hidden meaning (of language) exists in The essence of human experience of The researcher must take the position of texts, practices, events & situations, phenomena is only understood when the those researched (interaction) by sharing beneath apparent ones language & other tools (symbols) researcher separates their own experiences Application: to emancipate or liberate 3.6 Critical theory Research & theory should be used to change situations (focuses on power relations, critiques assumptions & evolves) 3.6a Emancipatory 3.6b Advocacy or 3.6c Feminism The subjects of social The world is patriarchal & participatory inquiry should be Politics & political agendas the culture it inherits is empowered should be accounted for masculine Application: to deconstruct 3.7 Post-structuralism Different languages & discourses divide the world & give it meaning 3.8 Post-modernism Truth claims are socially constructed to serve interests of particular groups, methods are equally distrusted; might not be possible to arrive at any conclusive definition of reality Application: any or all 3.9 Pragmatism All necessary approaches should be used to understand research problem

1.0 ONTOLOGY: What exists in the human world that we can acquire knowledge about?

Epistemologies in Sustainability Research – simplified!



Objectivism vs. Constructivism

Objectivism

Meaning exists within an object: an objective reality exists in an object independent of the subject

Constructivism

Meaning created from interplay between the subject & object:

subject *constructs* reality of object

Effects on how we study ,reality':

Mapping and analysing ,reality as a given' versus mapping ,reality as being constructed'

Objectivism





the conviction that reality is mind-independent; reality as an absolute;

What does this mean for empirical (social/natural science) research?

- Reveal categories & types found in nature >> to understand natural/social processes as factually given
- Which ecosystem dynamics can be observed that give us an idea of the systems future ahead?
- Which functions do different, actors in an ecosystem fulfill and how can changes be causally explained?
- What would you add here?
 - ➤ "My philosophy, in essence, is the concept of man as a heroic being, with his own happiness as the moral purpose of his life, with productive achievement as his noblest activity, and reason as his only absolute." (Ayn Rand)

Constructivism







Circular relationship of our self, communication (language) & social structures & practices (society)

What does this mean for empirical (social/natural science) research?

- Reveal categories & types used by actors and structure discourses & behaviors >> to understand power structures
- Which categories & types do our interviewees use to explain their reality?
- Which institutions, roles and behaviors do they attach to these types?
- What would you add here?

"It is the aim to (re)construct, based on which sensual relationships human act the way they act. The question is, how subjects, born into a historically and socially interpreted world, continuously (re)interpret and therewith change this world" (Reichertz/Schröer, 1994: 59).

Interdisciplinarity

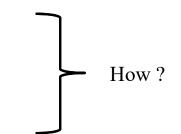


Logics of Interdisciplinarity:

- 1. Problem-solving
- 2. Accountability & Innovation
- 3. Transformational shifts of knowledge practices

Modes of Interdisciplinarity:

- 1. Integrative-synthesis
- 2. Subordination-service
- 3. Agonistic-antagonistic



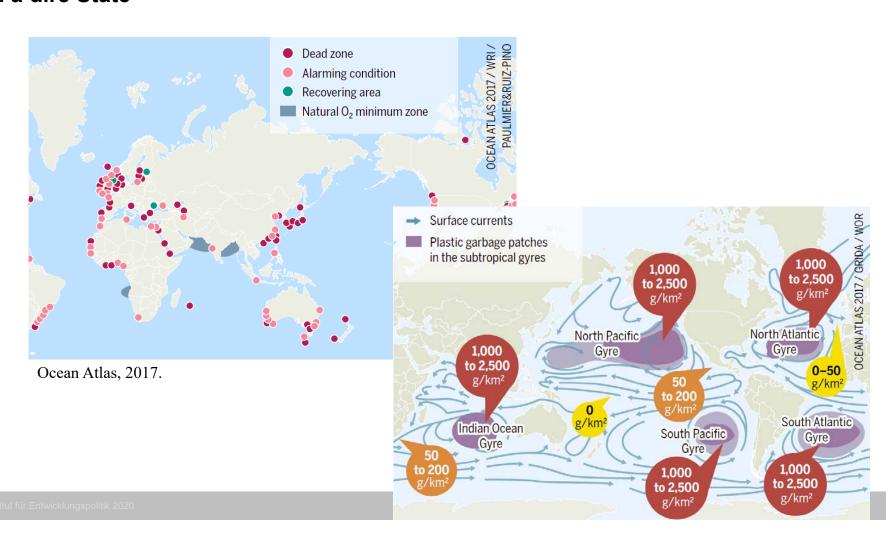
Why?

Barry, et al. 2008.

Interdisciplinarity for Problem-solving



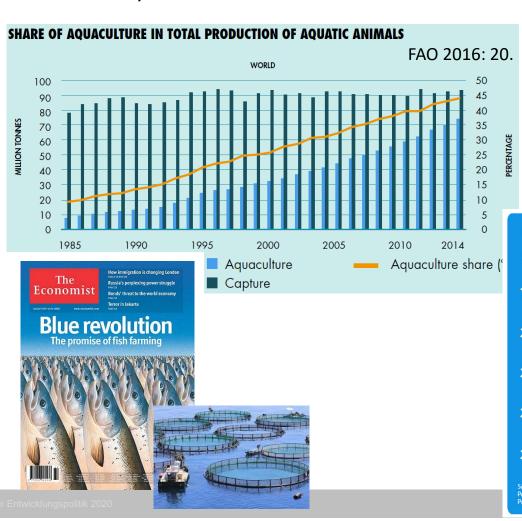
Ocean in a dire State





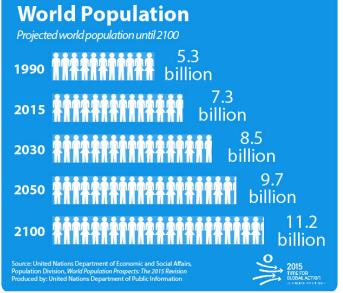
Interdisciplinarity for Accountability & Innovation

Blue Revolution for more ,Growth'



Aquaculture 2014:

44, 1% total fish production (incl. non-food)







Local empowerment through joint learning

Self-determined, self-driven envisioning of a future & development of innovations and transformative pathways towards these



Putting coastal communities back in charge

Target Outcome: 1 million people (500,000 people in the Pacific and 500,000 in Eastern Africa) have strengthened livelihoods through improved design and implementation of community-based resource management.

Coastal communities, particularly across the Pacific islands, are becoming increasingly affected as essential marine resources that support hundreds of thousands of people are diminished by impacts such as climate change and overfishing.

WorldFish promotes community-based resource management, which helps coastal communities safeguard the future of their resources, including coral, mangroves and fish. Our research links localized fisheries management innovations to broader-scale governance improvements through policy analysis and institutional strengthening.

Projects in Solomon Islands, for example, have worked to halt the degradation of inshore reefs and fisheries by stabilizing and starting to rebuild them—so as to protect local food security and livelihoods in coastal communities.

Target SDGs:







Interdisciplinarity

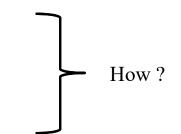


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Why?

Barry, et al. 2008.

Interdisciplinarity



Modes of Interdisciplinarity:

1. Integrative-synthesis

"the integration of two or more antecedent disciplines' in relatively symmetrical form" (28)

2. Subordination-service

"In this mode the service discipline(s) is commonly understood to be making up for or filling in for an absence or lack in the other, (master) discipline(s)."

3. Agonistic-antagonistic

"Interdisciplinary research is conceived neither as a synthesis nor in terms of a disciplinary division of labour, but as driven by an agonistic or antagonistic relation to existing forms of disciplinary knowledge and practice." (29)

Barry, et al. 2008.

Ocean Governance for Sustainability

Ocean Gov



Logic: Accountability & Innovation

Mode: Integrative-synthesis

European Network of Science, Policy & Practice

Research Needs:

- Contested Ownership of Ocean
- Fragmented Regulatory Frameworks
- Need for Sustainable Management Tools

& Policy Dialogue:







Research Areas:

- Land-Sea Interaction
- · Area-based Management
- Seabed Resources
- Nutrition Security
- Ocean Climate & Acidification
- Fisheries Governance



www.oceangov.eu

Contributors:

- 224 Members
- 143 Institutions
- 29 Europ.Countries

Newsletter

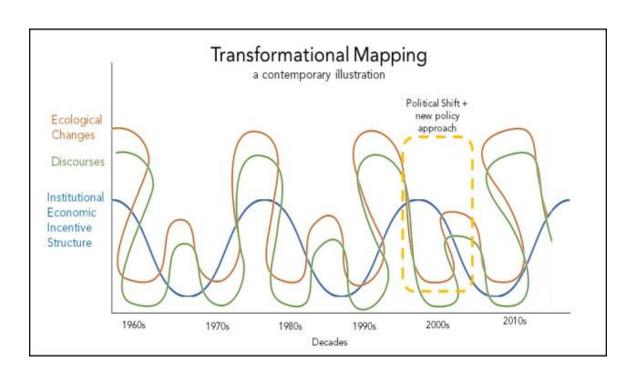






Logic: Transformational shifts of knowledge practices

Mode: Agonistic-Antagonistic or Subordination Service?





Dynamic relationship (or interdependence ?) of mangrove ecosystems, discourses and institutional incentive mechanisms over time

Agricultural Innovation Research, Uzbekistan



Logic: Problem-solving, Accountability & Innovation

Mode: Agonistic-Antagonistic

Boundary Concepts: 'Innovation', 'Stakeholder', 'Sustainable', 'Inter-', 'Transdisciplinarity'

Boundary Objects: institutional & technological Innovations

Boundary Settings:

Interdisciplinary & International Project Team

High-Tech Strategy Germany & Sustainable Development Mandate

Uzbek Agricultural State Plan



Hornidge et al. 2011; Ul-Hassan et al. 2011; Hornidge et al. 2016.

Land & Water Management, Uzbekistan

Project duration: 2001 - 2011

Donor, budget: BMBF, ca. 8.6 Mio Euro



Project objectives:

- Developing recommendations and simulation tools for improved agricultural policies
- Providing concepts for institutional restructuring for a more sustainable natural resource use
- Developing land and water management related innovations for improved productivity and sustainability of agricultural systems



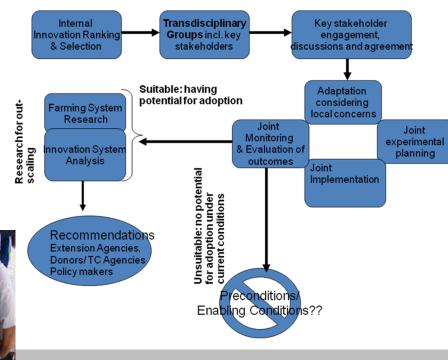


"Innovation is about simultaneously shaping technology and building society." (Bijker & Law, 1997)

,Follow the Technology' (Douthwaite et al, 2001)

- Technology with ,plausible promise'
- Real-life experimentation with innovators
- Process of trial, selection, improvement, outscaling

Step-wise Follow the Innovation-approach







Step-wise FTI-approach



Selected Innovations

- Afforestation on marginal/ degraded lands
- Advanced tools for rapid salinity assessment & improved irrigation scheduling
- Conservation of Agriculture (incl. precision leveling, intermediate tillage, permanent beds, residue & nutrient management)
- Strengthening Water Users Associations through SMID-approach

Output:

Team Formation, Stakeholder Selection, Roadmap Writing

Process Documentation, Innovation further development, partly diffusion & (academically) concept development









Interdisciplinarity



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Thank you!

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