

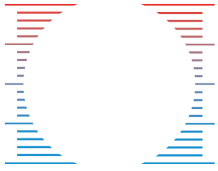
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# Transformations for sustainability? A critical analysis of systems approaches to social change

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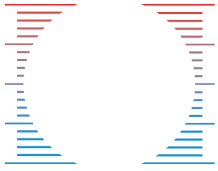


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## Background

- I conduct research on climate change adaptation and its governance in South Asia, Sub-Saharan Africa and Europe;
- My talk arises from discomfort with a growing emphasis on transformations as panacea for developmental & environmental problems
- I feel the dominant systems theories give us poor guidance on how to achieve successful or desirable transformations;
- Is there scope for more open-ended research on transformation?  
Thoughts in the making, not a final word...
- In what follows, 1) tentative assessment of theories and literature; 2) empirical insights; 3) reflections on achieving desirable transformations and researching them.

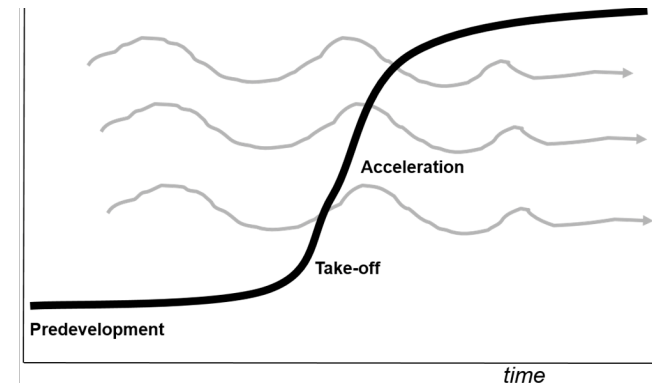


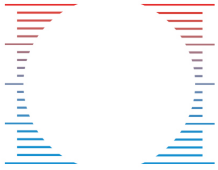
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# Resilience, adaptation & transformation

- ❑ **Resilience, adaptation and transformation** are concepts used to understand change and its management in environmental matters;
- ❑ They have their roots in the socio-ecological systems / adaptive management and socio-technical systems / transition management theories and approaches;
- ❑ Resilience is about a change for system stability;
- ❑ Adaptation is about a change to make most out of a changing system;
- ❑ Transformation is about changing the system for greater advantage. It is thus about non-trivial or -incremental change.



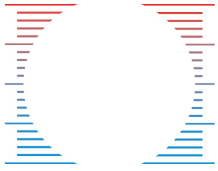


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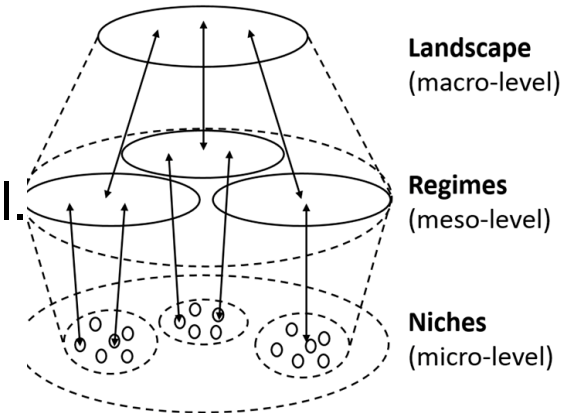
## **Socio-ecological Systems & Adaptive Mgt**

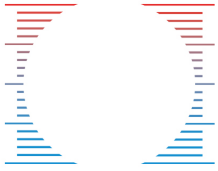
- ❑ SES approach is based on a complex-systems ontology which its governance arm AM shares: this leads to a modelling and simulation emphasis on SES.
- ❑ The approach ideal is that decisions on transformation should be based on comprehensive evidence obtained using an experimental testing strategy.
- ❑ However, comprehensive SES models are so complex and demanding that they really cannot be implemented at larger spatial scales / regarding larger, more complex environmental systems due to their information needs.
- ❑ SES are also considered so complex that it is futile to try and manage them in a top down way – experimentation within AM remains an alternative, but it also has its challenges of controllability etc.
- ❑ Experimentation is sometimes carried out in a bottom-up way but examples not comprehensive for transferability of lessons.
- ❑ Polycentric governance and facilitation of participation considered key needs.



# Socio-Technical Systems & Transition Mgt

- ❑ STS research and TM share the complex systems ontology: a three-tier structure of micro, meso and macro levels as aspects of a “regime”.
- ❑ Innovation is a form of experimentation at micro-level.
- ❑ Some innovations can transform sectors at meso-level and policies & governance at macro-level and thus transform the regime.
- ❑ Again STS are considered too complex for top down management – but desirable change can be fostered by vanguards in niches
- ❑ Pathways to desirable changes can be facilitated by institutions catering for bottom-up processes.





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## SES-STS theory & literature reflections

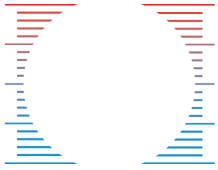
- ❑ Many complex socio-ecological systems (deltas, bio-economy) are actually combined SES-STS which is omitted in the literature;
- ❑ SES literature suggests that many ES are locked-in to a path leading to a collapse and that profound transformations are needed for sustainability; STS aspires to similar radical changes;
- ❑ But systems approaches are actually weak in understanding change processes: for them, lack of understanding explains non-change of systems, and the role of actors, agency and power in them is not understood or incorporated;
- ❑ The naïve lesson-transfer model leads to initiatives that are top-down, expert lead and insensitive to differential capacities and vulnerabilities of actors & differential impacts, desirability and uptake of initiatives (thus not implemented);
- ❑ Modeling emphasis oxymoronic and infeasible, narrative deployment of systems metaphor in cases perhaps the best way ahead.



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# Empirical Examples



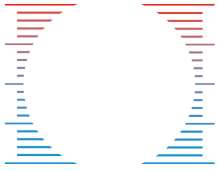
## Cox's Bazaar District, SE Bangladesh

- ❑ Example of somewhat successful livelihood transformation through mass migration, to an enhanced bio-economy!
- ❑ Low-lying Kutubdia Island (22k households) is on cyclone track. Cyclones have led to substantial loss of lives over time.
- ❑ Houses were destroyed by land erosion and rebuilt, often just to be re-destroyed. Other assets lost alongside.
- ❑ From 1986, households from the s-w part of the island started relocating to the mainland, establishing a new village Kutubdia Para which now has over 2000 households in it.
- ❑ Less than 100 households stayed behind.



**Source:** Islam M., Sallu S., Hubacek K, Paavola J. (2014). Migrating to tackle climate variability and change? Insights from a coastal fishing community in Bangladesh. *Climatic Change* 124: 733-746.





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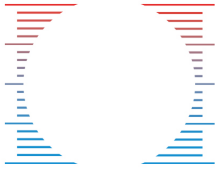
## Cox's Bazaar District, SE Bangladesh

- ❑ We examined how the households in the relocated community compared with those that stayed behind in terms of livelihood structures and outcomes;
- ❑ A multi-method approach of a household survey (150 hh), focus groups (8) and semi-structured interviews (43);
- ❑ Mass relocation as a transformative adaptation: could it work?

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**Source:** Islam M., Sallu S., Hubacek K, Paavola J. (2014). Migrating to tackle climate variability and change? Insights from a coastal fishing community in Bangladesh. *Climatic Change* 124: 733-746.



## Cox's Bazaar District, SE Bangladesh

- ❑ Migrants faced substantial start-up problems as their right to settle was first contested by mainlanders.
- ❑ The government affirmed the migrants' right to settle later.
- ❑ Better access to markets has led to increasing specialisation of livelihoods into fishing and fish drying.
- ❑ Migrants have fewer livelihood activities but higher incomes. They can save money and invest in livelihoods and education. They have good access to public services and cyclone shelters.

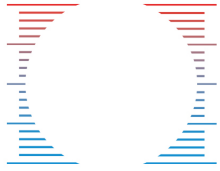
Table 1 Livelihood activities in study communities

Category	Livelihood activity	Percentage of households engaged in activity		
		In original community in 1980s, before migration <sup>a</sup>	Among non-migrants in 2011 <sup>b</sup>	Among migrants in 2011 <sup>b</sup>
Fisheries related	Fishing in the sea	39	36	26
	Fish drying	48	12	66
	Boat renting	10	6	9
	Boat making and repairing	2	2	2
	Fish trading	4	4	4
	Net making and mending	6	6	4
	Shrimp post-larvae collecting	0	32	4
	Mollusc shell collecting	0	20	0
	Aquaculture	0	8	0
Non-fisheries related	Salt producing	32	66	2
	Agriculture	40	28	0
	Daily labouring	15	24	12
	Cattle rearing	20	12	7
	Shop keeping	4	8	3
	Temporary seasonal migrating for work	0	14	0
	Driving (rickshaw or motorcycle)	0	4	8
	Small furniture making	0	8	0
	Job	0	6	3
Begging	0	4	0	

<sup>a</sup> Estimated from qualitative data

<sup>b</sup> Calculated from household surveys

**Source:** Islam M., Sallu S., Hubacek K, Paavola J. (2014). Migrating to tackle climate variability and change? Insights from a coastal fishing community in Bangladesh. *Climatic Change* 124: 733-746.



## Cox's Bazaar District, SE Bangladesh

❑ Those who stayed behind on the island include older and poorer people: lack of resources prevented their relocation.

❑ Those who stayed behind have more diversified livelihoods but lower incomes, as they cannot use their labour fully;

❑ They also remain exposed and sensitive to climatic hazards: subsequent events have depleted their assets and narrowed down their livelihood alternatives.

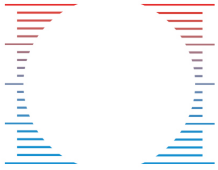
❑ Mass migration seems to have worked for the relocating members of the community

**Table 3** Current livelihood characteristics in study communities

Household livelihood characteristics	Non-migrants		Migrants	
	Mean	Standard deviation	Mean	Standard deviation
Household size	6.30	3.01	6.36	2.94
Highest education (years of schooling)	6.66	4.28	6.84	3.04
Number of adult workforce	3.36	2.12	3.57	1.92
*Physical fitness of household head to conduct livelihood activities (days/year)	324	29	342	33
*Quality of house <sup>a</sup>	1.41	0.88	2.04	1.53
Number of fishing or fish drying materials	0.22	0.68	0.31	0.49
Percentage of households use sanitary toilet	18	N/A	21	N/A
Percentage of households use phone	50	N/A	75	N/A
Percentage of households use radio or television	34	N/A	22	N/A
Percentage of households use solar or electricity for energy	14	N/A	55	N/A
Percentage of households use safe drinking water source	70	N/A	100	N/A
Percentage of households own transportation	2	N/A	12	N/A
Percentage of households possess land	10	N/A	7	N/A
Percentage of households possess tree	62		92	
*Per capita fish consumption (kg/month)	0.94	0.67	2.89	1.32
Percentage of households have livestock	70	N/A	70	N/A
Percentage of households have jewellery	62	N/A	93	N/A
Percentage of households have stored food	10	N/A	10	N/A
*Per capita income of households (Taka) (1 US\$=76 Taka) <sup>b</sup>	16,577	24,942	34,374	46,875
*Percentage of income from fisheries source	56	36	92	16
Social capital <sup>c</sup>	9.08	0.97	9.38	1.70
*Number of income generating activities	2.78	0.95	1.73	0.93
*Time involvement in fisheries (days/year)	139	78	216	25
Time needed to reach the nearest public services (minutes)				
*Cyclone shelter	18.54	20.12	39.10	7.89
*Safe drinking water source	15.34	21.97	4.91	6.05
*Market	33.18	28.03	15.51	7.85
*Disaster office	43.70	28.92	31.31	6.46
*Government office complex	45.00	28.41	31.31	6.46
Hospital or clinic	35.52	26.85	30.24	6.98
*Educational institution	20.46	19.05	11.49	8.54

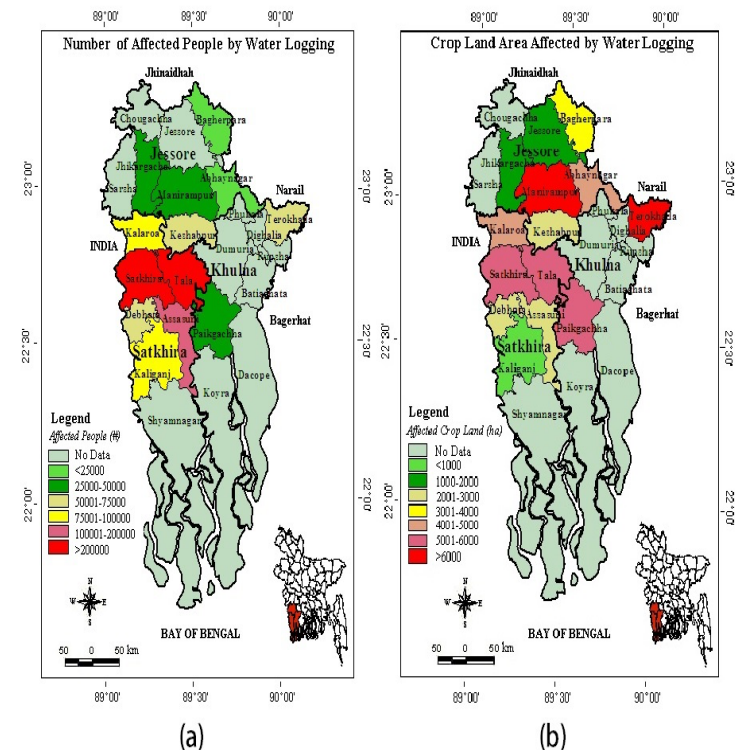
\*Statistically significant ( $p < 0.05$ ) difference exists

**Source:** Islam M., Sallu S., Hubacek K, Paavola J. (2014). Migrating to tackle climate variability and change? Insights from a coastal fishing community in Bangladesh. *Climatic Change* 124: 733-746.

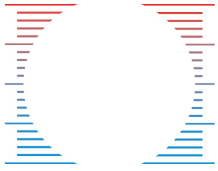


## Satkhira district, SW Bangladesh

- ❑ Example of mal-adaptive transformation partly away from bio-economy?
- ❑ In Satkhira District in Bangladesh households are exposed to flooding.
- ❑ Flood protection measures built in the 1960s created polders that trap sediment to rivers, raising the riverbeds.
- ❑ Rivers frequently overflow their banks: agricultural land remains inundated for long periods because of poor drainage
- ❑ In the absence of public interventions or other institutional solutions, people are adapting autonomously



Fenton A, Paavola J, Tallontire A (2017) Autonomous adaptation to riverine flooding in the Satkhira District, Southwest Bangladesh: insights for transformation. *Regional Environmental Change*.



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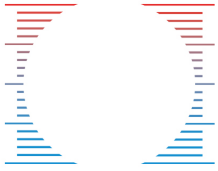
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## Satkhira district, SW Bangladesh

- ❑ A multi-method approach of focus groups (30 hh), a household survey (266 hh) & semi-structured interviews (38 hh).
- ❑ Livelihoods followed a pattern of cash crop (jute) cultivation during summer and high-yield rice cultivation in winter. Cash crops provided income, while rice provided food security.
- ❑ Persistent flooding and water logging now prevents conventional farming.
- ❑ Livelihood transformation and rebuilding of homesteads that collapse in flood water needed;
- ❑ Markets govern autonomous adaptation and access to credit influences ability to adapt;



Fenton A, Paavola J, Tallontire A (2017). The role of microfinance in household livelihood adaptation in the Satkhira District, Southwest Bangladesh. *World Development* 92, pp. 192-202.



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## Satkhira district, SW Bangladesh

- ❑ Two-track transformation has occurred.
- ❑ Poorer households can only access micro-finance for small loans: it is expensive and can only fund incremental adaptations.
- ❑ Poorer households smooth consumption, abandon cultivation, migrate to work for wages nearby, and have declining incomes.
- ❑ Poorer households have become indebted because MF not suited for non-income generating adaptations such as securing homesteads and smoothing consumption.
- ❑ Loans obtained for paying loans, defaults happen

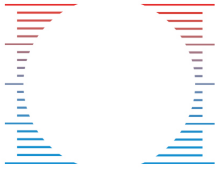


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## Satkhira district, SW Bangladesh

- ❑ Wealthy households can access less expensive bank credit in larger quantities for non-incremental / transformative adaptations
- ❑ Key strategies: 1) educating and sending youth abroad to work and send remittances, and; 2) investing to transition to aquaculture, often on land rented from low-income households;
- ❑ They have improved and climate-proofed their income. But collective mal-adaptation may ensue although some households adapt successfully.
- ❑ Measures would be needed to alter risk exposure, open up new feasible adaptation options, and to offer new finance products.

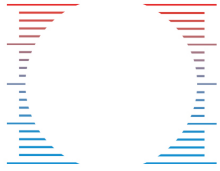




## Arising insights

- ❑ Transformations are not always voluntary or planned, nor desirable.
- ❑ Exposure, vulnerability and adaptive capacity vary in local communities, and so do access to resources & decision making processes & structures;
- ❑ Bottom-up transformations in the context of existing weak institutions often gives effect and accentuates these background inequalities;
- ❑ This creates a risk of **dual track transformations**; a large majority may have their assets depleted and incomes decreased and a wealthy minority able to climate-proof their livelihoods and assets;
- ❑ State-led planned adaptation could reduce the risk for all, to provide viable adaptation alternatives and to improve access to resources for adaptation;
- ❑ But state involvement is not trivial: political will, capacity and resources are not automatically in place to support transformations, and their deployment has to overcome resistance from powerful interests in status quo.





# What's in it for a transition to bio-economy?

- ❑ A shift away from fossil fuels and resources to renewable energy and resources to tackle food security, climate change, resource dependency...
- ❑ The transition is a complex co-evolution process of economic, **technological**, institutional, cultural and **ecological** developments at different scales
- ❑ Such transformations take time and need both radical & incremental innovation. It is about doing it better and RI is about doing it differently, it is about system innovations and transitions.

Bosman R, Rotmans J. (2016) Transition Governance towards a Bioeconomy: A Comparison of Finland and The Netherlands. *Sustainability* 2016, 8(10).

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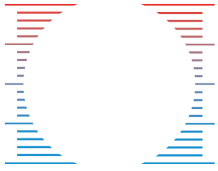
Suomi on bio- ja kiertotalouden sekä cleantechin edelläkävijä. Kestävien ratkaisujen

## HALLITUSKAUDEN TAVOITTEET PAINOPISTEALUEELLE



## KÄRKIHANKKEET

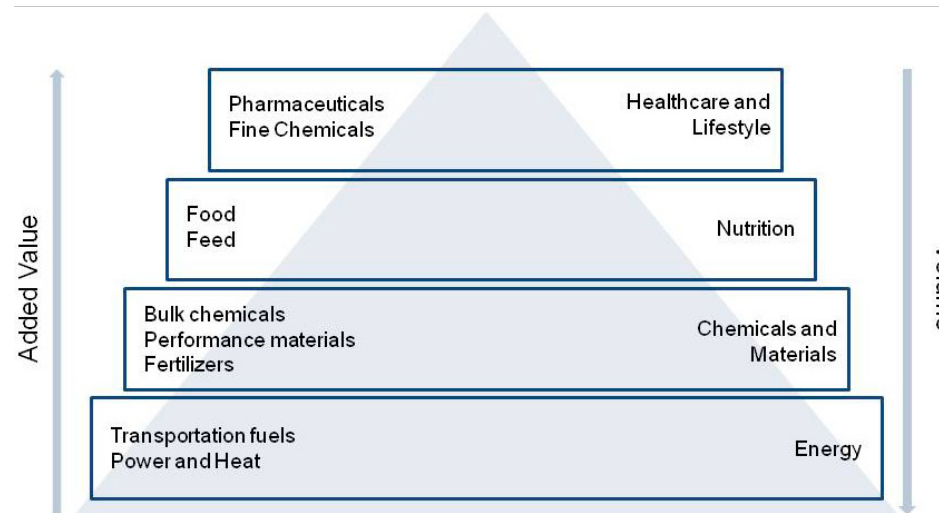
- 1** Hiilettömään, puhtaaseen, uusiutuvaan energiaan kustannustehokkaasti  
100 milj. €
- 2** Puu liikelle ja uusia tuotteita metsästä  
50 milj. €
- 3** Kiertotalouden läpimurto ja puhtaat ratkaisut käyttöön  
63 milj. €
- 4** Suomalainen ruoantuotanto kannattavaksi, kauppatase ja sininen biotalous nousee  
100 milj. €
- 5** Luontopolitiikka luottamuksella ja reiluin keinoin  
10 milj. €

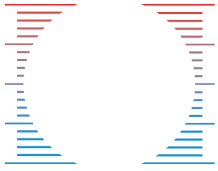


# Transition to sustainable bio-economy?

Transitions are contested processes involving multiple visions and pathways. They involve challenging status quo and resistance from vested interests of incumbent organisations. The complex transition towards a bio-economy can involve sub-transitions:

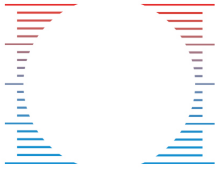
1. Detaching agricultural sector from the fossil sector;
2. Detaching chemical sector from the fossil sector;
3. Converting the chemical sector into a food-health sector;
4. Refocusing forestry sector from bulk to high-end specialty products.





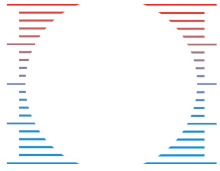
## What happened with the bio-economy strategy in Finland

- The priorities of bio-economy strategy suggest forestry incumbents & their policy counterparts shaped strategy to emphasise high-volume, low-value biomass use.
- The priorities undermine the climate change and biodiversity credentials of bio-economy and are detrimental to other ecosystem service flows that could benefit wide range of actors and employment & income earning opps (the SES side)
- The priorities also leave an innovation vacuum, unrealised opportunities for new lines of production that could have facilitated economic growth, employment and carbon sequestration at the same time (the STS side).
- The result is that the benefits of the transition are likely to captured by a narrower range of actors, with a more limited contribution to the level and diversity of employment and income earning opportunity.
- The costs and risks of transitions are externalised to other actors, such as local governments, visitor economy enterprises, farmers, home owners etc.



## What happened with the bio-economy strategy in Finland 2

- The distribution of power / problematic procedural justice underpinnings of Finnish bio-economy strategy development are behind its distributive justice implications.
- What governance reforms, other initiatives would help recognising and giving more voice to other interests in strategy and policy development?
- Systems approaches may structure an inquiry usefully, but it needs political economy / ecology / environmental justice sensitivities to achieve analytical depth.
- This calls for interdisciplinary or/and transdisciplinary working, not only to include and engage relevant experience and expertise, but to achieve critical mass.
- Biodiversity metaphor reminds us of need for intellectual diversity, multi-culturalism and inclusiveness: not always comfortable, but comfort is seldom driver of progress.
- Dispersion of authority to non-state actors through polycentric arrangements could support transformation but is not automatically forthcoming as needs state facilitation.
- More research needed on the role of institutional complexity and polycentric and hybrid forms of governance in supporting transformation.



## Key references

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