

Supplementary Material

Please include in each file the following information: article title, journal name, author names; affiliation and e-mail address of the corresponding author.

Title: Interactions between first and second order risks in coastal adaptation: applying a cross-scale analysis to understand SES robustness and vulnerability in Cornwall, U.K.

Journal Name: Regional Environmental Change

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Caption:

This file is the codebook which was used to code the interviews and workshop material into the Robustness Framework categories. It is included to show the rigour of our analyses and provide more information on the coding of place-based actor data for use in the system scale Robustness Framework.

MAGIC Cornwall

Robustness Framework Codebook

Adapted from Anderies (2015, Figure 3, p. 271)

Created by: Ute Brady

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Variable Name	Description
Link 1	Interactions between R and RU
R to RU	Processes/interactions: Economic production, i.e., private consumption, investment into public infrastructure = $Y(e)$ (natural infrastructure, hard human-made infrastructure, social infrastructure, human infrastructure). Verbs: produce, support, provide
RU to R	Processes/interactions: economic asset allocation/coordination = $U(e)$ (natural infrastructure, hard human-made infrastructure, social infrastructure, human infrastructure, soft human-made infrastructure) Verbs: value, pollute, own, care for, steal, exploit, cultivate, waste
Link 2	Interaction between RU and PIP
PIP to RU	Processes/interactions: Inclusion in decision-making, resources Verbs: idealize, survey, inform, ignore, empower, make responsible
RU to PIP	Processes/interactions: Information sharing, resources Verbs: criticize, claim (money), petition, fund, lobby, corrupt
Link 3	Interaction between PIP and PI (hard and soft)
PI to PIP	Processes/interactions: Information (sharing/flow) Verbs: make responsible, shape, occupy, distract

Variable Name	Description
PIP to PI	Processes/interactions: Public infrastructure asset allocation/coordination = $U(\pi)(\text{natural infrastructure, hard human-made infrastructure, social infrastructure, human infrastructure, soft human-made infrastructure})$ Verbs: provide, shape, repair, maintain
Link 4	Interaction between PI (hard and soft) and R
PI to R	Processes/interactions: Contribution to economic production, i.e., private consumption, investment into public infrastructure = $Y(e)()$ Verbs: modify, concentrate, designate, protect, preserve, restrict, augment
R to PI	Processes/interactions: Contribution to governance production = $Y(g)(\text{natural infrastructure, hard human-made infrastructure, social infrastructure, human infrastructure, soft human-made infrastructure})$ Verbs: erode, augment, supply
Link 5	Interaction between PI (hard and soft) and link 1
Link 1 to PI	Processes/interactions: Potential spillovers of interaction between R and RU/PU and R that affect PI (hard and soft) Verbs: adjust, stimulate
PI to Link 1	Processes/interactions: Governance production, i.e., monitoring, sanctioning, conflict resolution, information sharing, deliberation, coordination = $Y(g)(\text{governance production-link 5})$ restricts $U(e)(\text{economic asset location-R to PU})$ which affects distribution of $Y(e)(\text{economic production (private consumption, investment into public infrastructure-PU to R)})$ Verbs: regulate, rule, restrict, plan
Link 6	Interactions between PI (soft and hard) and PU
PI to PU	Processes/interactions: Public infrastructure production = $Y(\pi)(\text{natural infrastructure, hard human-made infrastructure, social infrastructure, human infrastructure, soft human-made infrastructure})$ Verbs: limit, control, define, legitimize

Variable Name	Description
RU to PI	Processes/interactions: Potential spillover affects of attributes of the community that affect PI (hard and/or soft) Verbs: become owner of, claim, vandalize, value, utilize, enjoy
Link 7	Exogenous drivers on RU and PI (soft and hard)
Link 7 to PI	Exogenous driver (or shock) affecting hard and/or soft infrastructure (e.g., hurricane destroying electrical power plant) Verbs: destroy, justify, damage, make obsolete
Link 7 to R	Exogenous driver (or shock) affecting R (e.g. climate change, drought, loss of biodiversity) Verbs: disturb, reinvigorate, destroy
Link 8	Exogenous drivers on RU and PIP
Link 8 to PIP	Exogenous driver (or shock) affecting PIP (e.g., neoliberalism, influence of global treaties on national PIP decision-making) Verbs: unnerve, help, aid, constrain
Link 8 to RU	Exogenous driver (or shock) affecting RU (e.g., high rate of economic or social inequality) Verbs: attract, value, change, scare
Reported interaction or condition	
Negative	Negative interaction or condition
Neutral	Neutral interaction or condition
Positive	Positive interaction or condition
Unclear	Unclear interaction or condition - requires further collaboration

Variable Name	Description
Private hard human-made infrastructure	
Private hard infrastructure accessible to PIPs	Private hard human-made infrastructure that is accessible to individual infrastructure providers
Private hard infrastructure accessible to RUs	Private hard human-made infrastructure that is accessible to individual Resource Users, e.g., tractor, electric irrigation pump, privately owned fishing vessel
Public infrastructure	
Hard human-made infrastructure	e.g. energy delivery systems, roads, railways, airports
Soft human-made infrastructure	Rules, norms, and shared strategies
Public infrastructure providers (attributes of the PIP)	
Human infrastructure	Capacities of individual agents to process information and make effort allocation decisions
Resource	Natural infrastructure including any hard human-made infrastructure (coupled infrastructure system perspective)
Hard human-made infrastructure	The human-made infrastructure that facilitates the flow of affordances from the resource to the resource users (e.g. irrigation canal, roads, access to public power grid)
Natural infrastructure	Resource from which affordances flow (e.g., freshwater, fish stocks, land)

Variable Name	Description
Resource users (attributes of the community)	
Human infrastructure	Capacities of individual agents to process information and make effort allocation decisions
Social infrastructure	Web of relationships among agents that allows them to connect to one another in order to exchange material and information
Social infrastructure available to PIPs	Web of relationships among PIPs that allows them to connect to one another and exchange material and information
Social infrastructure available to RUs	Web of relationships among RUs that allows them to connect to one another and exchange material and information