

**UNIV.PROF.DR. ULRIKE
PRÖBSTL-HAIDER
DR. ALICE WANNER**



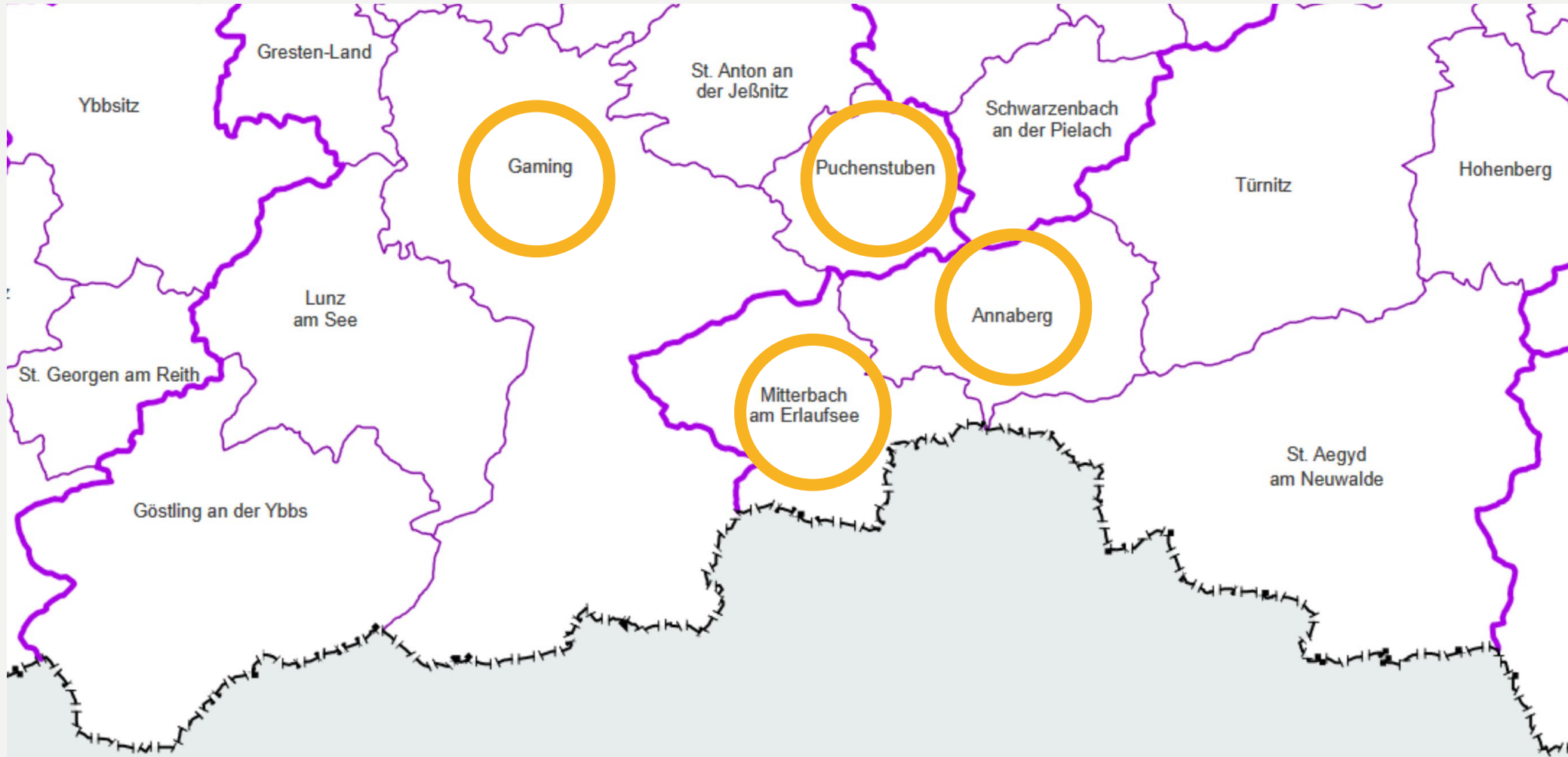
ROMI

**REGIONAL RESILIENCE BASED ON ECOLOGICAL, ECONOMIC AND SOCIAL
KNOWLEDGE AND INNOVATION IN THE ÖTSCHER REGION**

HARD FACTS

- Austrian Climate Research Programme funded by FFG (grant no FO999907894)
- Partners:
 - BOKU – ILEN
 - BOKU – IRUB
 - GeoSphere Austria
 - Univeristy of Illinois at Urbana Champagne
- 1st September 2023 – 31st August 2025

COMMUNITIES: GAMING, MITTERBACH, ANNABERG UND PUCHENSTUBEN



MAIN GOALS

- This proposal addresses the challenges of a transformative change aiming for a fundamental shift, that questions values and routine practice and changes prior perspective employed to rationalize decisions and pathways.
- The case study region is expecting a significant shock in the near future and several long-term changes requiring a transition towards resilient, sustainable regional development. **Currently, the region's future perspectives, including land use and local quality of life, are the subject of pessimistic discussions.**
- Therefore, the project aims to strengthen the capacity of the region to renew itself in a dynamic environment, to extend its ability to act in order to overcome future challenges.

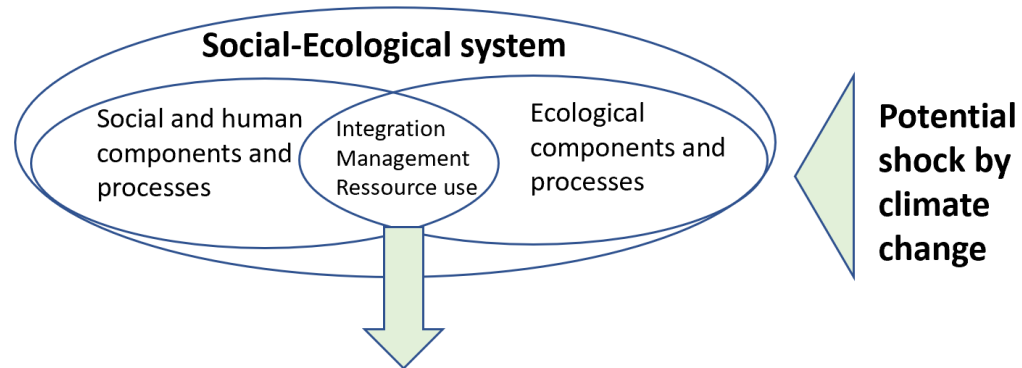


OVERVIEW AND MAIN METHODS

WP2 **Definition of the region by participatory GIS**

Definition of the region in a participatory manner

WP3 **Understanding the Social-Ecological System influencing the resilience in the study region**



Inventory and understanding of the social-ecological system, its vulnerability and possible risks and related management actions

WP4 **Dynamic adaptive pathways (DAP)**

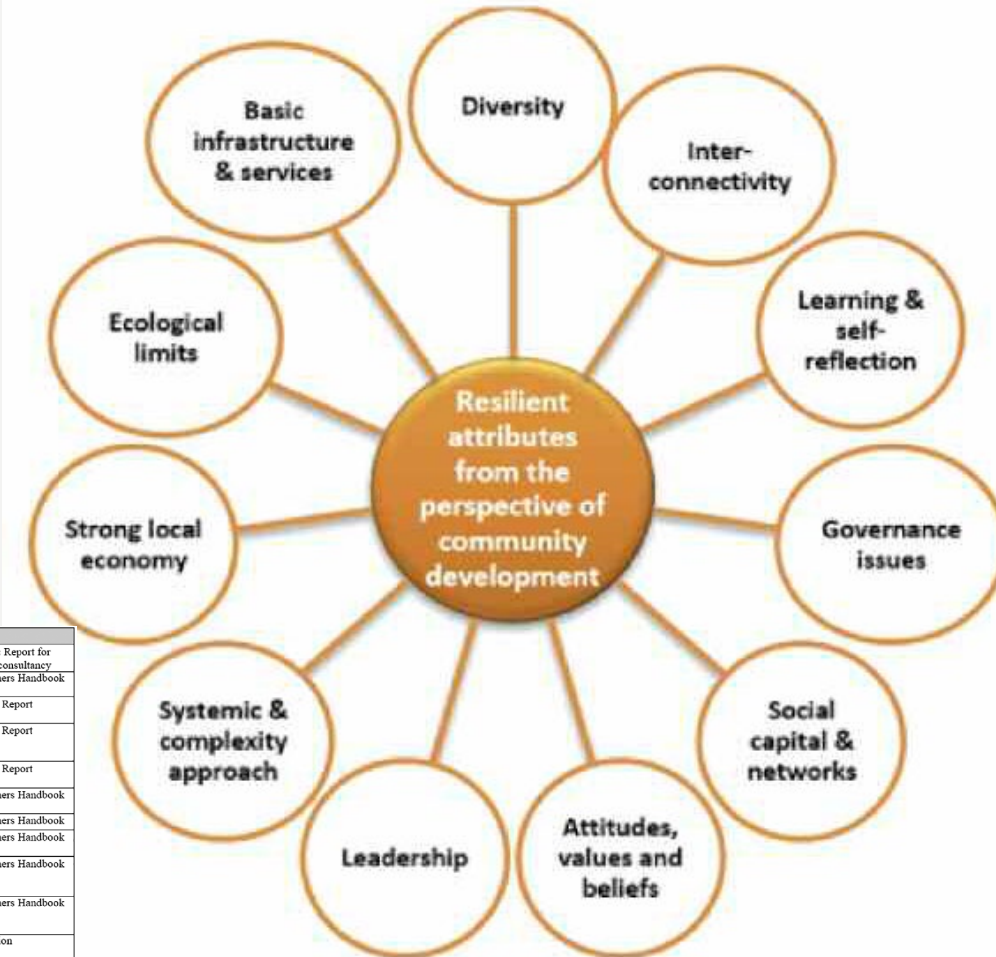
Definition of possible pathways for future development

WP5 **Choice experiment (CE) and decision support system (DSS); selection of the most preferred pathway**

Selection of a resilient pathway for the regional development

FROM COMMUNITY RESILIENCE TO REGIONAL RESILIENCE

- **Key questions:** Recent resilience research focussed mainly on community resilience and selected criteria and indicators accordingly.
- What kind of indicators and respective data are needed on a regional level?
- How can they be used to evaluate the given resilience and
- how can we achieve and measure a new evolutionary resilience and determine future goals ?

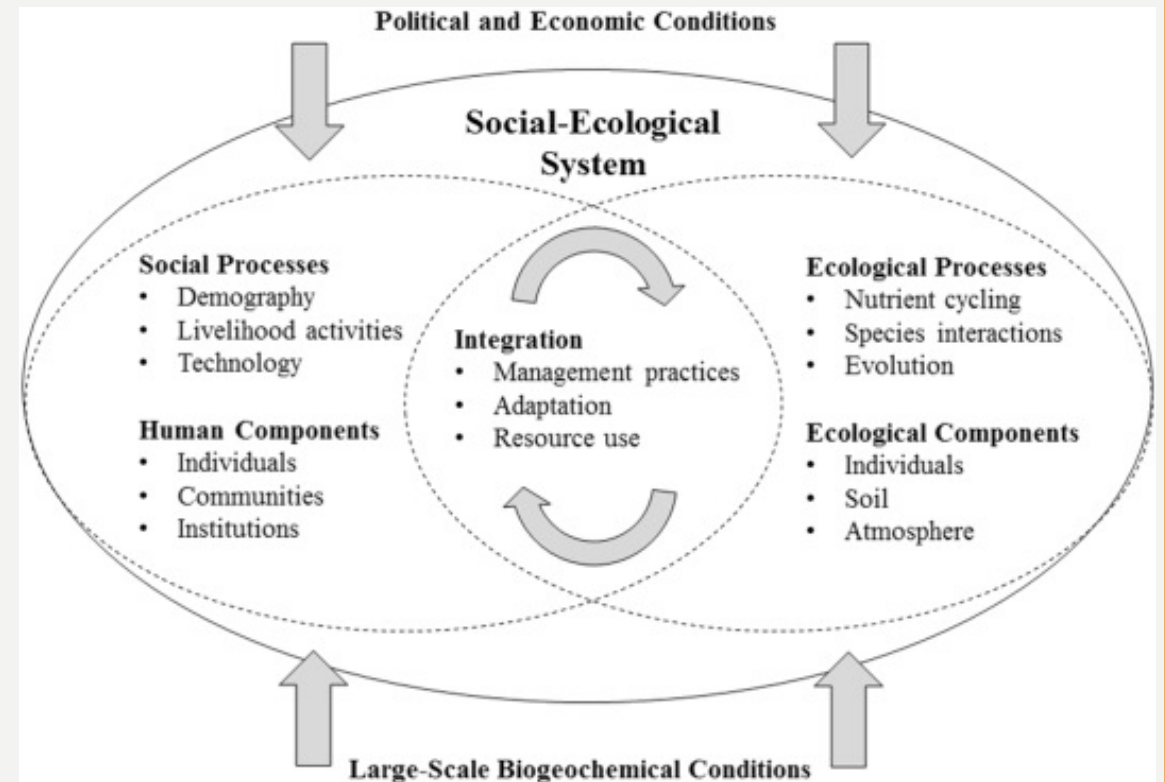


| Document title | Author | Country | Year | Type |
|--|---------------------------------------|---------|------|---|
| Neighborhood Sustainability Indicators Guidebook | Meter | USA | 1999 | Scientific Report for political consultancy |
| The Community Resilience Manual. A resource for rural recovery and renewal | Colussi | CA | 2000 | Practitioners Handbook |
| Innovation in Rural Queensland. Why some Towns Thrive while others Languish | Plowman, Ashkanasy, Gardner & Letts | AU | 2003 | Research Report |
| Assessing a community's capacity to manage change: A resilience approach to social assessment | Maguire & Cartwright | AU | 2008 | Research Report |
| Building Resilience in rural Communities Toolkit | Hegney et al. | AU | 2008 | Research Report |
| Building Inclusive and Resilient Communities | Australian Social Inclusion Board | AU | 2009 | Practitioners Handbook |
| Community Resilience Toolkit | Schwand | USA | 2009 | Practitioners Handbook |
| The Community Resilience Manual - Version II | Canadian Centre for Community Renewal | CA | 2009 | Practitioners Handbook |
| Beyond Economic Survival: 97 Ways Small Communities Can Thrive - A Guide to Community Vitality | Stolte & Metcalfe | CA | 2009 | Practitioners Handbook |
| Assessing Resilience in Social-Ecological Systems: Workbook for practitioners. Version 2.0 | Gundersen et al. | SE | 2010 | Practitioners Handbook |
| Localisation and Resilience at the Local Level: The Case of Transition Town Totnes | Hopkins | UK | 2010 | Dissertation |
| Wie gehen Regionen mit Krisen um? Eine explorative Studie über die Resilienz von Regionen | Lukesch et al. | AT | 2010 | Explorative Study |
| Exploring Community Resilience in times of rapid change | Wilding | UK | 2011 | Practitioners Handbook |
| Regionale Resilienz - Neue Anforderungen für Österreichs Regionalpolitik? | Gruber | AT | 2011 | Scientific Report for political consultancy |
| Resilience and Transformation - A Regional Approach | ECOTRUST | USA | 2012 | Scientific Report for political consultancy |
| Strengthening Neighborhood Resilience - Opportunities for Communities & Local Development | Barter | CA | 2013 | Practitioners Handbook |
| Community Resilience To Climate Change: an Evidence Review | Twigger-Ross et al. | UK | 2015 | Research Report |
| Rural Vibrancy in North-West Europe - The Case of South Kerry | O'Keeffe | EU | 2015 | Research Report |
| Six Foundations for Building Community Resilience | Lerch | USA | 2015 | Practitioners Handbook |
| Building Community Resilience | Blakeley | NZ | 2016 | Scientific Report for political consultancy |

REGIONAL RESILIENCE & SOCIO-ECOLOGICAL SYSTEM

concept of resilience in our context:

- Rural resilience is characterized by a flexible system which is able to adapt to external shocks or to transform from one state to another when an external disturbance occurs.
- Resilience in the context of rural development is thus **the capacity of a system** to renew itself in a dynamic environment, to strengthen and to extend its ability to act in order to overcome future challenges.
- The resilience of a system is therefore a key aspect of its sustainability.



Example by Virapongse et al. 2016

REGIONAL RESILIENCE & SOCIO-ECOLOGICAL SYSTEM

- **Key questions:** The capacity of a system is reflected by the respective socio ecological system.
- How can the resilience of dynamic rural social-ecological systems be assessed? and
- What measures can reinforce the interactions between the components underlying a social-ecological system in a rural area, in order to maintain a certain desirable system state?
- How can rural development policies be analyzed, based on their contribution to a resilient SES?
- What is needed in terms of policy measures, to enhance the resilience of rural SES?

Table 1 - Approaches to assess resilience in social-ecological system

| Author | Discipline | Assessment objective | Methodology | Result |
|---|-----------------------|--|---|--|
| <i>Case study approach</i> | | | | |
| Rose, A. (2005) Modeling regional economic resilience to disasters: a computable general equilibrium analysis of water service disruptions | Economics | To advance a CGE analysis for application to estimating the regional economic impacts of earthquakes and other disasters | Develop methodology for recalibrating CGE model parameters with empirical estimates of production losses due to a lifeline supply disruption. | Application of the model showed how indirect economic losses vary according to the overall level and sectoral mix of water shortages, the extent of pre-event mitigation and post event inherent and adaptive resilience |
| Bruneau, M., S. E. Chang, R.T. Eguavchi, G.C. Lee, T.D. O'Rourke, A.M. Reinhorn, M. Shinozuka, K. Tierney, W.A. Wallace, D. Von Winterfeldt (2003) A Framework to quantitatively assess and enhance the seismic resilience of communities | Ecology | To define seismic resilience of communities and quantitative measures of resilience that can be useful for a coordinated research effort focusing on enhancing this resilience | Framework relying upon complementary measures of resilience and includes quantitative measures for robustness and rapidity, resourcefulness and redundancy, together integrated into four dimensions of community resilience. | The framework can be used for comprehensive characterization of the earthquake problem to establish needs and priorities. The contribution of various activities to seismic resilience can be evaluated. |
| Ives, A. (1995) Measuring Resilience in Stochastic Systems", in Ecological Monographs 65 (2) 1995, pp. 217-233. Ecological Society of America | Ecology | To measure resilience in a stochastic ecological system | Deterministic resilience= return time to equilibrium. Stochastic resilience= ratio of variability in population densities to variability in population growth rates, calculated from community matrix describing the average interaction strengths within and among species | Simple methodology that can be applied to a wider range of ecological communities |
| Tierney, K., Bruneau, M (2007) Conceptualizing and Measuring Resilience: a key to disaster loss reduction, TR News, June 2007 | Ecology and Sociology | To define disaster resilience, and to develop measures appropriate for assessing resilience and demonstrate the utility of the concept through empirical research | Development of the R4 framework of resilience including four components robustness, redundancy, resourcefulness, and rapidity. | The framework suggests a range of approaches to enhance resilience, and to develop a robust organizational and community capacity to respond to disasters. |
| Elbourne, A., D. Lanser, B. Smid and M. Vromans, 2008, Macroeconomic resilience in a DSGE model, CPB Discussion Paper. | Economics | To use the dynamic stochastic general equilibrium (DSGE) model to analyze the resilience of an economy in the face of external shocks | Relevant measure for resilience is the level of expected discounted utility. Combining micro founded structural approach with empirical models, taking into account the effects of labour market, goods market and capital market inflexibilities in response to supply and demand shocks | Effect of market rigidities (price stickiness, wages) on the expected level of utility is minimal. Especially when comparing to the effect of market competition, while having a direct effect on output. |

DEVELOPMENT OF DYNAMIC ADAPTIVE PATHWAYS

- identification of different possible pathways and robust actions that can support the targeted system to adapt to changing climatic, social, environmental and economic conditions (co-developing a multitude of future scenarios)
- Main Goal : Understanding key factors for regional resilience, their relevance and their possible interactions, to use this knowledge for a transformation process based on a transdisciplinary approach aimed at different adaptive pathways.

New
input

Cheap
housing





Energy
autarky

Alterna-
tive
tourism

Climate
model
region

CHOICE EXPERIMENT

- The overall goal to discuss and define the preferred pathway based on a representative survey with choice experiment.
- The choice experiment (CE) is a quantitative survey technique, which models intended behavior, and recognizes that complex decisions are based on several factors considered simultaneously.
- The local population will be asked to choose between various options which have different social, economic and ecological benefits and contribute in different ways so a sustainable development.
- Possible attributes: Energy, job opportunities, image, social benefits, economic development.....

| | ALTERNATIVE A | ALTERNATIVE B |
|--|---|---|
| | Windrad in Randlage | Windrad in Randlage |
| |  |  |
| | Kleine PV Anlage | Kleine PV Anlage |
| |  |  |
| Investitionsmodell (Finanzierungsform) | Bürgeranlage | Bürgeranlage |
| Strompreis in 2020 (derzeit ca. 29 Cent/kWh) | 30 Cent | 30 Cent |
| Einsparungen der Haushalt durch Anlagenertrag | 10% | 50% |
| Stromversorgungsgrad der Marktgemeinde in 2020 | > 100% | > 100% |

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tive
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INNOVATION AND OPPORTUNITIES FOR PUBLICATIONS / DISSERTATION

- The multidisciplinary lens through which we are implementing the concept of resilience,
- The application of a dynamic understanding of the resilience concept, ability to transform
- The definition of a regional resilience (instead of a community-based concept)
- The conceptual framework combining SES and DAP form the basis for an applicable, future-oriented regional development. The local acceptance and the preference of selected pathways will be tested by a quantitative survey tool (**choice experiment**) and discussed based on a related decision support tool.
- The proposal finally integrates different initiatives into one main transdisciplinary process.



Contributing to
2 Dissertations at BOKU
1 Dissertation at Illinois U.



QUESTIONS?

THANK YOU!

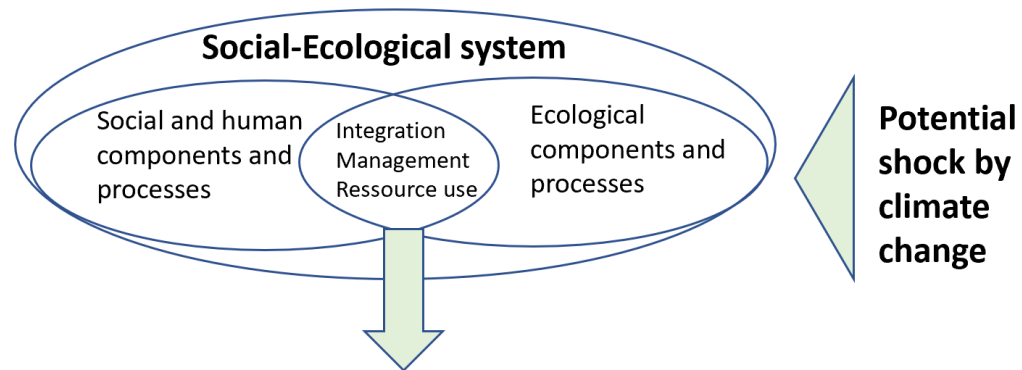
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NETWORKING AND COOPERATION

| Partners: Work package | BOKU-ILEN | BOKU-IRUB | ILLINOIS | GEO-SPHERE | LOCALS |
|---------------------------|--|---|--|---|-----------------------------------|
| WP 1 PM | <u>Formal respons.</u> | | | | |
| WP 2 Map | <u>Formal respons.</u> Regional borders | Suitability check | | Suitability check | Contributing Suitability check |
| WP 3 SES | Suitability check evaluation | Suitability check Implementation Provision of data, evaluation | <u>Formal respons.</u> Methodological approach | Suitability check Implementation Provision of data, evaluation | Provision of data, evaluation |
| WP 4 DAP | Contribution of development options | <u>Formal respons.</u> Contribution of development options | Contribution of development options | Contribution of development options | |
| WP 5 Choice | <u>Formal respons.</u> Choice exp. | testing | testing | testing | Selection of suitable dev. |
| WP 6 Dissem. | <u>Formal respons.</u> Draft | contributing | contributing | contributing | Local dissem. |

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