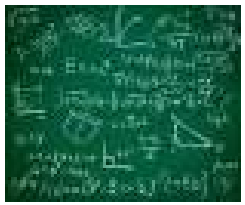
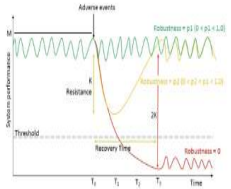
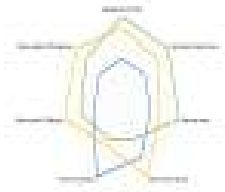
IRN QARESS

QuAntitative Resilience-based managEment and Sustainability for Social-ecological Systems

kick-off MPL, December, 2024



Agenda

- ***Monday December 2, 2024: Salle des actes MSHSUD***
  - 09:00 - 09:10: Introduction of IRN QARESS (L. Doyen, CNRS, CEE-M)
  - 09:10 - 09:30 Q. Grafton (Crawford Institute of Public Policy, AUS) (video) Realizing Resilience for decision making
  - 09:30 - 10:00: L. Doyen (CNRS, CEE-M) : Bioeconomic resilience based management and viability
  - 10:00 - 10:30: C. Béné (CGIAR - WUR, NL): Food systems resilience
  - 10:30 - 11:00: Coffee Break
  - 11:00 - 11:30: R. Voss (IDIV - Univ. Kiel, Germany): Ecological-economic modeling to support a sustainability transformation of the western Baltic fisheries socio-ecological system.
  - 11:30 - 12:00: M. Ekue (CIAT, Cameroon) : Agroforestry for the resilience of farming systems in Africa
  - 12:00 - 12:30: V. Yatat (Ecole Nationale Polytechnique Yaounde, Cameroon): Bioeconomic resilience of Savannas
  - 12:30 - 14:00: Lunch, Jardin D'hiver MSHSUD
  - 14:00 - 14:30: G. Zaccour (HEC Montreal, Canada) (visio): Dynamic Games Played over Event Trees with Coupling Constraints
  - 14:30 - 15:00: C. Kebaili (IDIV, CEEM): Income sharing for collective goods with uncertain benefits
  - 15:00 - 15:30: P. Courtois (CEDM, INRAE, France): Bio-economic modelling for the operational management of biological invasions.
  - 15:30 - 16:00: Coffee Break
  - 16:00 - 18:30: Discussion

19:30: **Symposium Dinner** within the historical Center of Montpellier: *Brasserie du Theatre* (22 Bd Victor Hugo, 34000 Montpellier) https://maps.app.goo.gl/[illegible]

- ***Tuesday, December 3, 2024: Salle des actes*** MSHSUD
  - 09:00 - 9:30: C. Gerling (University Cottbus, Germany): Cost-effective biodiversity conservation under climate change.
  - 09:30 - 10:00: J.M. Fromentin (UMR MARBEC, France) (visio): Vulnerabilities vs. resilience in international bluefin tuna management
  - 10:00 - 10:30: R. Sabatier (INRAE, France) : Towards resilient diversified agro ecosystems.
  - 10:30 - 11:00: Coffee Break
  - 11:00 - 12:30: Brainstorming by groups:
    - (a) Role of cooperation for resilience-based management : animation Nicolas Querou (CNRS, CEEM)
    - (b) Risk versus crisis management: animation Luc Doyen (CNRS, CEEM)
  - 12:30 - 14:00: Lunch Jardin D'hiver MSH
  - 14:00 - 15:30: Restitution Brainstorming by groups
  - 15:30 - 16:00: Coffee Break
  - 16:00: Perspectives and closing

International Research Network (IRN)

CNRS international cooperation tools

International Emerging Actions (IEA)	International Research Networks (IRN)	International Research Projects (IRP)	International Research Laboratories (IRL)
Bottom-up exploration tool	Strengthening a collaboration		Enlightening emblematic actions decided at a strategic level with a strong local presence
Building a capacity to develop our strategic orientations	Simplifying international agreement processes		

Scientific context: Resilience: popular but ....

The rising popularity of resilience contrasts with a lack of clarity over the concept and its implementation

Derissen, Quaas, Baumgärtner (2011); Béné, Godfrey-Wood et al. (2012); Downes et al. (2013); Villasante et al.(2013); Grafton - Little (2017); Bene-Doyen (2018), ...

- No generic metrics across disciplines
- Bad resilience
- Resilience management ?
- Resilience with respect to what ?

Motivations

nature sustainability

PERSPECTIVE

https://doi.org/10.1038/s41893-019-0376-1

Realizing resilience for decision-making

R. Quentin Grafton[1,2*], Luc Doyen[2,3], Christophe Béné[4], Edoardo Borgomeo[5], Kate Brooks[6], Long Chu[1], Graeme S. Cumming[7], John Dixon[1], Stephen Dovers[8], Dustin Garrick[9], Ariella Helfgott[5], Qiang Jiang[10], Pamela Katic[11], Tom Kompas[12], L. Richard Little[13], Nathanial Matthews[14], Claudia Ringler[15], Dale Squires[16], Stein Ivar Steinshamn[17], Sebastián Villasante[18], Sarah Wheeler[19], John Williams[1] and Paul R. Wyrwoll[1]

The 3 R's

Grafton, Doyen, Béné et al. 2019

System characteristics to measure resilience

1. **Recovery Time**: Holling (1973), Pimm (1984),

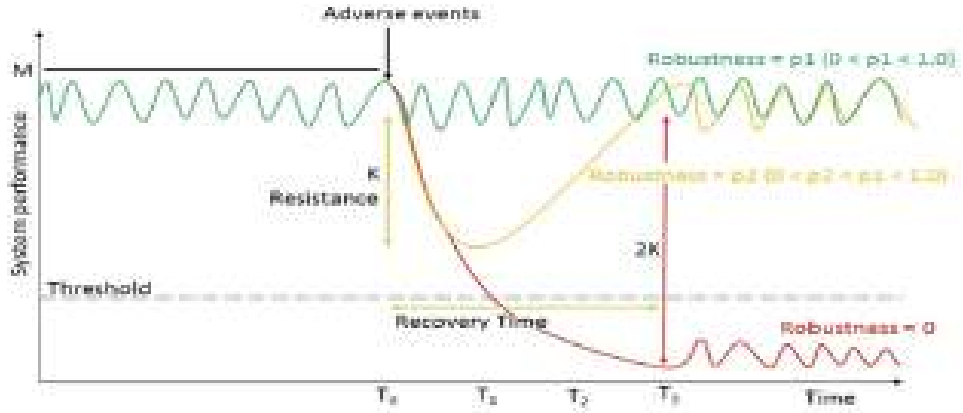
   time to achieve a desired state following adverse events

2. **Resistance**: Harrison (1979)

   magnitude of adverse events that can be coped with

3. **Robustness**: reliability, Carlson & Doyle (2002)

   the probability of a system to stay in a desired state facing adverse events



From the 3R's to the 7S's (steps) of resilience heuristic

Table 1 | Three management contexts using a socio-economic resilience heuristic

Management steps	Resilience for surface water flows	Resilience for emergency management of communities	Resilience for marine wild-capture fisheries
System definition, boundaries and drivers	Water catchment. Catchment dynamics are affected by both human activity and by natural fluctuations.	Small community (~2–3,000) well-defined spatially. Residents' activities include farming and timber extraction, and social interactions.	Multi-species fishery. Dynamics of the system depend on natural mechanisms (for example, growth and recruitment), fishing activities and environmental drivers.
Stakeholders	Farmers, tourists, water agencies and NGOs.	Community residents.	Fishers, consumers, regulating agencies and NGOs.
Metrics identification	Water quality and quantity, the net economic return of water users, and environmental quality scores.	Employment, production, and consumption/food security, and ecosystem services.	Biomass estimates and indicators of fishing production and profitability.
Viability goals and metrics	Positive net returns for farmers, guaranteed stream flows, cultural needs and safe thresholds.	Human safety, maintaining infrastructures, water and electricity supply, and economic activities.	Stock thresholds, such as precautionary limits, and also minimum profit levels for the harvesting sector.
Adverse events	Droughts or floods.	Wildfires.	Recruitment failures.
Quantification of the three Rs	Resistance: measures of ecosystem health (species diversity) or habitat functionality (vegetation cover). Recovery: recovery time for population of key species. Robustness: probability of 'normal' water inflows.	Resistance: safety margins for multiple metrics (environmental, economic, health and social). Recovery: magnitude, type and scale of resources post-disaster. Robustness: probability of not having wildfires.	Resistance: population viability analysis of key fish stocks. Recovery: responses to annual recruitment variability, regime shift, climate change and socio-economic shocks. Robustness: probability of fish stocks, catches or fisher profits not falling below pre-defined thresholds.
Resilience-management actions and benefits	Construction of infrastructure for inter-basin transfers, storage (surface and aquifer), water extraction and policies that affect land-use and vegetation type.	For wildfire risk management, prescribed burning and fuel treatment.	Modern fisheries management includes active adaptive management as a response to large, and frequently unpredictable, adverse events and also uncertainty over fisher responses.

QARESS general scientific objectives

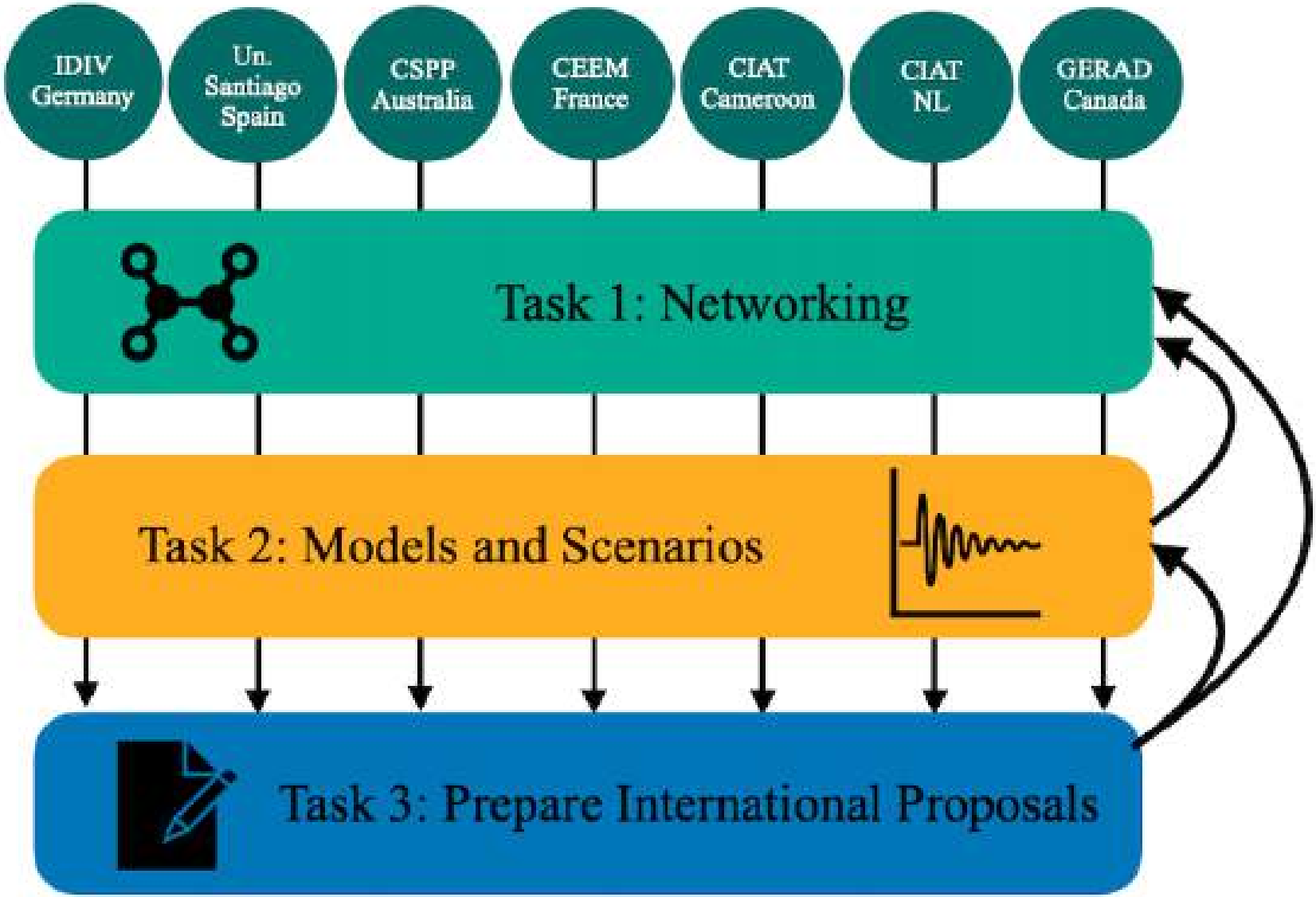
In line with 3R's and 7S's framework

- Advance quantitative resilience-based management and model-based scenarios for SES
- Focus on forest, farming and fisheries SES
- Case studies in Australia, Europe, and Africa; Comparative analysis across case studies
- Role of cooperation and diversification ?

QARESS Consortium

International and interdisciplinary

QARESS Tasks

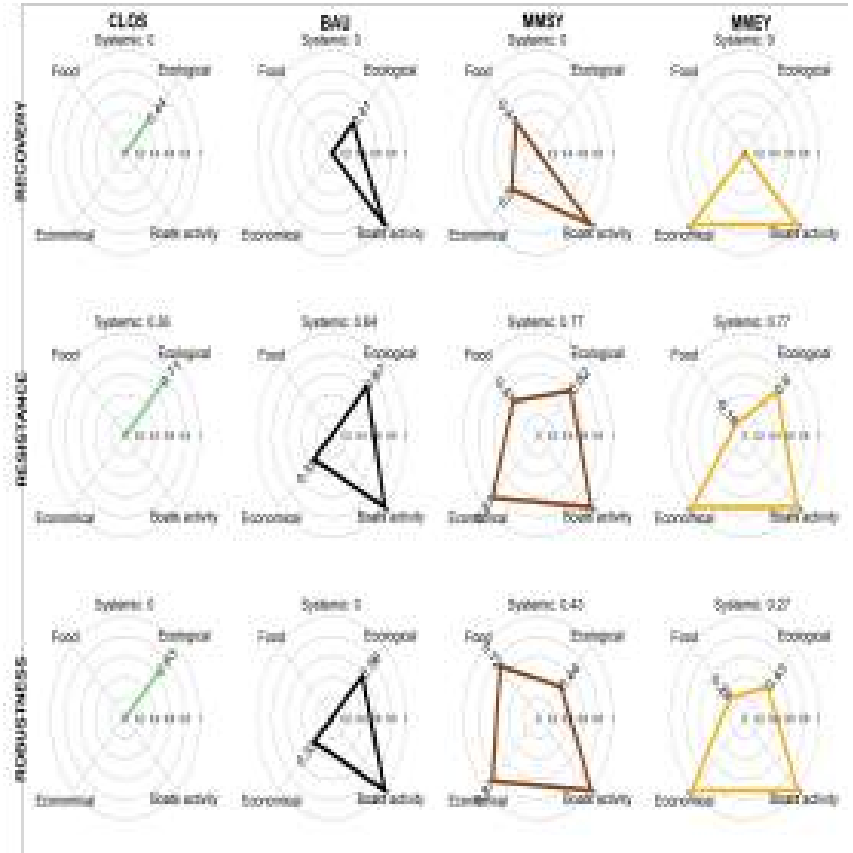


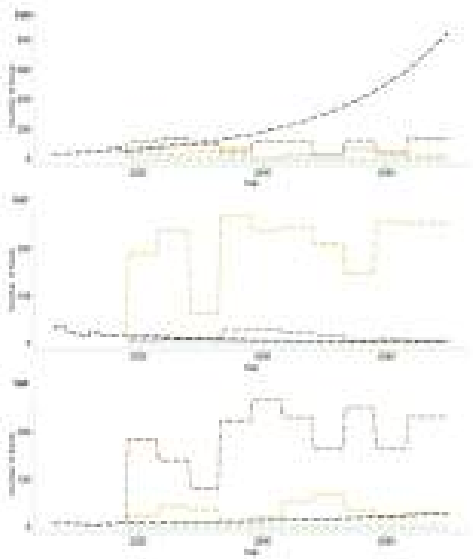
QARESS Agenda

Tasks/Years	*2024*	*2025*	*2026*	*2027*	*2028*
T1: Networking	Symposium Montpellier	Symposium Amsterdam	Conference Canada	Conference Canberra	Summer School
T2: Development of model-based scenarios					
T3: Prepare international proposals					

Similar projects: Applying the 3Rs in French Guiana

Cuilleret, Doyen, Gomes et al. 2022, Economic Analysis and Policy

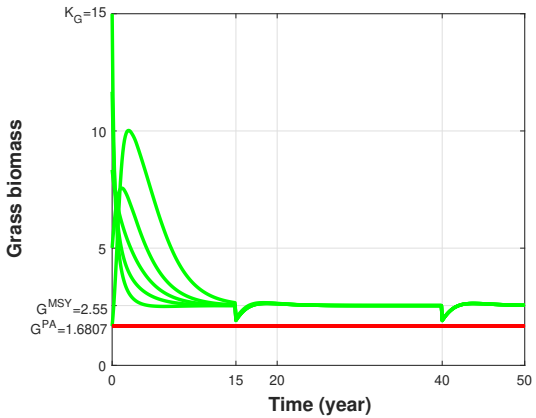




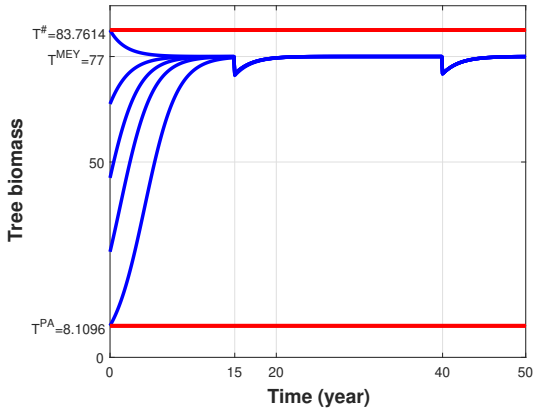
ERICA project in Cameroon

Yatat, Doyen, Tewa et al., Env. Model. Assess. (2024)

Savana bio-economic resilience



Grass



Tree