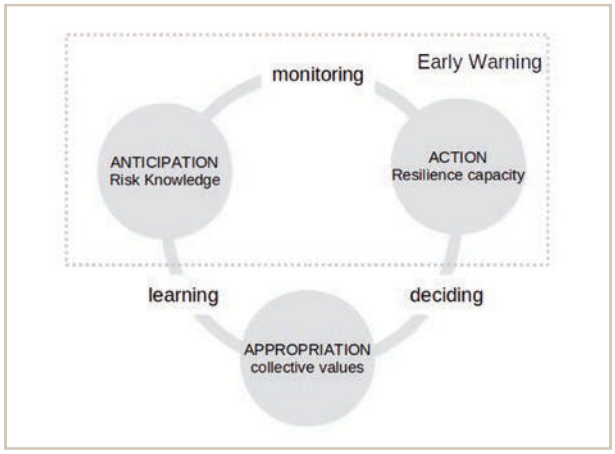
ANTICIPATORY ACTION
IN ADAPTIVE RISK GOVERNANCE

THE ISSUE

ANTICIPATORY ACTION: SHAPING THE FUTURE OF HUMANITARIAN RESPONSE

THE 3 As OF ADAPTIVE RISK GOVERNANCE

According to the prospective theory or foresight[1], Anticipatory Action (AA) relates to appropriation. Early warning systems (EWS) are necessary, but not enough to move towards AA. In terms of adaptive risk governance (ARG), this means that risk knowledge (anticipation) — related to climate change geohazards and georesources interlinked with armed conflicts, both triggering economic crisis— and response capacity to foster the resilience of vulnerable populations at risk (action) must consider a collective goal based on shared values and articulated through governance mechanisms being in place. In the context of ARG, AA may be defined as the capacity to anticipate action through appropriation considering social learning and decision support systems.



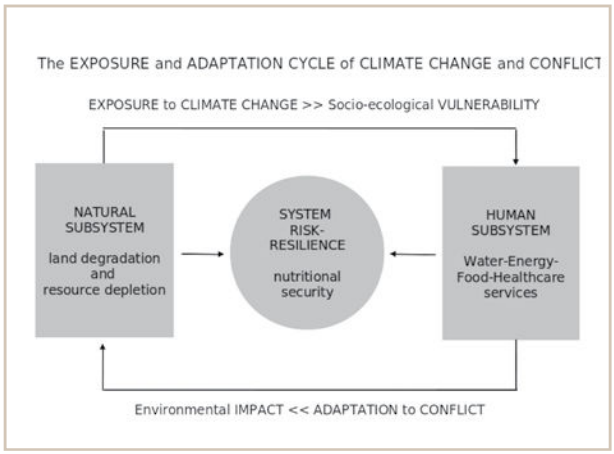
The 3As of Adaptive Risk Governance

A FOCUS ON NUTRITION SECURITY RESILIENCE

Action Against Hunger International defines nutrition security as the outcome of good health, a healthy environment, good caring practices, as well as household food security. Nutrition security is achieved when all household members have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences. Additionally, a sanitary environment, access to clean water, adequate health services, and appropriate care and feeding practices are necessary to ensure an active and healthy life.

> "By considering the focus on resilience, it is possible to measure the effectiveness of intervention strategies and policies on different types of vulnerable groups according to prospective scenarios through benchmarking."

The increasing importance of climate change and conflicts in relation to water, energy, food security, and healthcare exposes vulnerable populations to risk. At the same time, populations struggle to access the delivery of basic services, increasing social tensions and conflicts. Inappropriate adaptation strategies may have an impact on environmental degradation which, in turn, increases the exposition to the effects of climate change (induced hazards) and environmental services. Therefore, the exposition-adaptation cycle characterises Human Earth Systems Complex Intersections (HESCI).



The exposure-adaptation cycle

Both vulnerability and impact determine the resilience of the system under risk. Resilience happens when vulnerable populations adapt to different coping strategies over time to achieve a new level of vulnerability. The feedback loop of the cycle can be positive or negative. By considering the focus on resilience, it is possible to measure the effectiveness of intervention strategies and policies on different types of vulnerable groups according to prospective scenarios through benchmarking.

1. Godet, M. (1994). From anticipation to action: A handbook of strategic prospective, coll. Futures-oriented Studies. Paris: Unesco Publishing. The French version of this book was published in 1991 by Dunod: De l'anticipation à l'action: Manuel de prospective et de stratégie.

SOME CONCEPTUAL IMPLICATIONS

The exposure-adaptation cycle involves two key points when considering risk knowledge. The risk equation *Risk = Hazard x Vulnerability* considers the vulnerability when exposed to a hazard. However, social-ecological vulnerability[2] is shaped by the political ecology of a territory, in a way that exposure to a hazard is intrinsic to vulnerability. Vulnerable individuals and communities, in terms of economic capacities and governance in the allocation and distribution of food and basic services delivery under the Universal Declaration of Human Rights (including a clean environment), become exposed to geohazards and related armed conflicts. Which occurs due to territorial asymmetries of power, involving situations of spatial justice[3]. This means risk exists when the hazard is individually perceived and collectively accepted as such.

The second point is that rethinking risk knowledge involves the adaptation capacities of vulnerable groups and their resilience. Considering the possible positive and negative feedback effects of adaptation actions may increase the impact of geohazards and related conflicts on these groups. The early works of Cendrero and Panizza[4] on social geosciences, may help to understand the relationship between risk and impact through resilience as *Risk hazard = Impact + Resilience* (where resilience refers to the capacity of adaptation of an exposed vulnerable group over time).

An example of such an approach was developed on the scope of a land evaluation in Chinandega, Nicaragua,[5] where food security resilience was calculated in terms of affordability to basic food baskets by household income. Household production units of small tenants or land use types managing different land use units may adapt to adverse climate change events such as "El Niño" through production diversification in home gardens. This would help in reducing their vulnerability and exposure, as well as impact on soil erosion on slopes, avoiding landslides.

Consequently, the risk-resilience equation is not only affected by the probabilistic temporal and spatial occurrence of a hazard that determines the intensity of damage (vulnerability). Most risk analyses are based on forecasting with excessive quantification and extrapolation based on past data. But when dealing with the human factor in the context of Human Earth Systems Complex Intersections (HESCI), the exception is the rule ("black swans") and the past does not explain the future ("stochastic parrots"). As dangerous is dismissing the importance of path dependence, as overrating emergency phenomena. As exposure changes so does adaptation, involving the need for foresight scenarios coupling the probability of occurrence with adaptation strategies over time. Thus, risk analysis should focus on explanatory and normative modelling to give a better insight into how to restore resilient communities through innovation in territories.

SOME GEOETHICAL CONSIDERATIONS

Modelling is a key element in ARG because results have a great influence on decision-making and the whole of society, highlighting the role of social geosciences. Therefore, there are several points to take into consideration from a geoethical point of view. Models are valuable exercises, but certainly, they may limit the holistic understating of Human Earth Systems Complex Intersections (HESCI) because of the inherent irreversibility and uncertainty when analysing the interrelatedness and interdependence of complex systems. Therefore, it is important to keep in mind prevention and responsibility principles. Prevention, which is implemented by adopting strategies that improve the resilience of human communities and reduce the extent of economic and environmental effects of geohazards to restore and improve environmental health and human well-being, is an ethical duty[6]. In turn, the responsibility principle refers to the socio-ecological implications of geosciences research to (a) produce and implement valid and tailored scientific results according to societal needs, (b) develop geo-educational and dissemination tools, and (c) cooperate with and support decision-making processes with key social actors in relation to prevention[7].

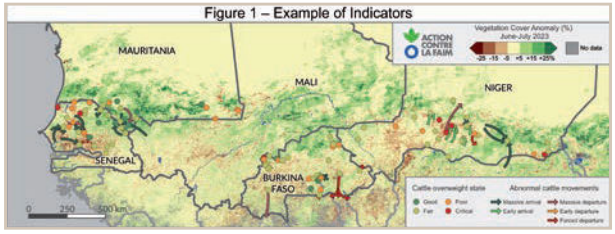
2. Depietri, Y. (2020). The social–ecological dimension of vulnerability and risk to natural hazards. Sustain Sci 15, 587–604 . https://doi.org/10.1007/s11625-019-00710-y
3. Soja, E.W. (2010). Seeking Spatial Justice. Minneapolis: University of Minnesota Press.
4. Cendrero, A. & M. Panizza (1999). Geomorphology and Environmental Impact Assessment: an introduction – Suppl. Geogr. Fis. Dinam. Quat., 3 (3): 167-172.
5. van der Zee, J.J. et. al. (2001): Convenio Instituto de Capacitación e Investigación en Desarrollo Rural – Solidaridad Internacional España (2001). Identificación de opciones productivas y manejo ecosostenible de seis municipios del norte de Chinandega.
6. Peppoloni, S. & Di Capua, G. (2022). Geoethics: Manifesto for an Ethics of Responsibility Towards the Earth. Cham: Springer. ISBN 978-3030980436. https://doi.org/10.1007/978-3-030-98044-3
7. Peppoloni, S. (2023). Geoethics to Face Natural Risks by Improving Societal Resilience. In: Malheiro, A., Fernandes, F. & Chaminé, H.I. (eds) Advances in Natural Hazards and Volcanic Risks: Shaping a Sustainable Future. NATHAZ 2022. Cham: Advances in Science, Technology & Innovation. https://doi.org/10.1007/978-3-031-25042-2_1

Two points of special interest to consider the geoethical approach in a model are how the models are built and how the models are used. Because the second refers to the appropriation of AA above mentioned, the first deserves further elaboration. Considering the human geoethical aspect in adaptation when modelling has some nuances[8]. Furthermore, science is not a neutral process, and values are largely within the modeller's thinking framework. So, the dimension of values in the model is largely influenced by the modeller's views of reality and how modellers assumed reality operates. Some good practices that may help to overcome such challenges are:

1. Stakeholder's participation in setting objectives, processes, and results aiming for legitimacy.
2. Recognition of the diversity of knowledge, values, and nature agency by bottom-up modelling.
3. Spatial representation of unequal distribution of basic services and environmental degradation.
4. Ensure a transparent methodology and results using modelling protocols.
5. Due accountability of results through open peer-reviewed evaluation.
6. Secure durability and governance for effective decision-making through institutional integration.

Acción Contra el Hambre Spain has taken forward some of these practices in the Pastoral Early Warning System (PEWS). Although PEWS does not provide risk scenarios, it performs as a surveillance system covering pastoral areas in the Sahel. It disseminates pastoral surveillance information to pastoralists' nomadic population through communication channels, strengthening the link between monitoring and the humanitarian response to droughts and climate events.

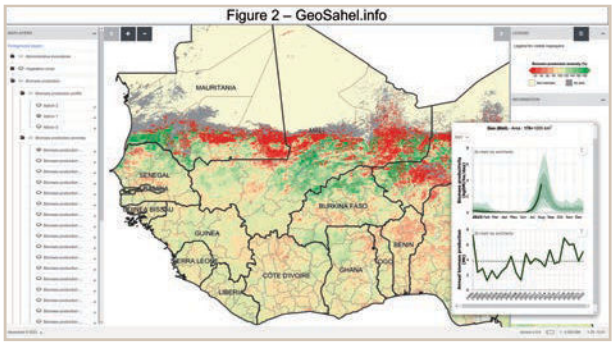
Figure 1 – Example of Indicators



Example of PEWS Indicators. Cattle overweight was reported by the pastoral sentinel network at the start of the rainy season 2023 overlay, with the instantaneous total vegetation coverage including green vegetation and dry vegetation retrieved from MODIS satellite observations (product source: GEOGLAM RAPP).

> "As spatial dimension and field evidence is straightened out, it seems interesting to combine artificial intelligence and machine learning techniques in profiling vulnerability with a case study qualitative approach."

Figure 2 – GeoSahel.info



The GeoSahel.info interactive cartographic platform illustrates the biomass production anomaly for the rainy season of 2023, featuring both map visualisations and temporal profiles, along with a comparison to previous years.

SUMMING-UP

In the context of Adaptive Risk Governance, Anticipatory Action needs to adopt a geoprospective approach. A geoprospective purpose is not finding the best prediction or the best solution to a problem, but it aims at better understanding future changes to enrich the decision-making process considering that spatial dimension takes a major role in the modelling[9].

As spatial dimension and field evidence is straightened out, it seems interesting to combine artificial intelligence and machine learning techniques in profiling vulnerability with a case study qualitative approach. Case studies use triangulation in data analysis. Comparative aggregation of case studies does not only allow calibration of model results but has a considerable role to play in a better interpretation of the results building a coherent narrative. Furthermore, risk knowledge is not seen as an extractive process, but is continuously referred to for the most vulnerable, improving our understanding of the evolution of a territory.

In conclusion, risk modelling is rather a bottom-up process that allows capturing a certain interrelatedness that is not achievable by statistical processes alone, making sense of data (data outside a spatial context do not have any meaning and are an open door for enlightened digital absolutism in how to comprehended reality). In turn, it has a considerable impact in terms of humanitarian work taking into consideration the technical user's expertise and knowledge, giving voice to the most vulnerable.

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8. Kunsch, P.L., Theys, M. & Brans, J.P. (2007). The importance of systems thinking in ethical and sustainable decision-making. Cent. Eur. J. Oper. Res., 15, 253–269. https://doi.org/10.1007/s10100-007-0029-8
9. Voiron-Canicio, C. & Fusco, G. (2021). Knowledge challenges of the geoprospective approach applied to territorial resilience. In: Garbolino, E. & Voiron-Canicio, C. (eds) Ecosystems and Territorial Resilience. A Geoprospective Approach. Elsevier, pp.57-84. https://doi.org/10.1016/B978-0-12-818215-4.00003-1