Understanding alteration in ecosystem dynamics

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Climate change has already happened and continues to happen. It affects both temperature and precipitation, but with the exception of high altitude and high latitude regions, changes in water availability are probably more drastic and certainly more visible. The billion dollar agricultural sector of Central California has just had its water allocation reduced by over 60%. For other semi-arid regions, severe water shortages are predicted. If economic, social and ecological damage is to be limited decision makers must be proactive and incorporate climate risks into governance.

In order to facilitate decision making based on climate change, scenarios have been developed that are meant to integrate current knowledge with perceived trends to provide a sense of "plausible" futures. Such scenarios are more useful for examining the degree understanding of earth systems, than for actual prediction and decision making. Most commonly distortions are introduced into plausible futures for a lack of integration between different parts of the earth system. Understanding Climate - Ecosystem interactions, is such an area where much science integration is still needed.

A recent Nature article with over 50 listed authors sets out to show the "Decoupling of soil nutrient cycles as a function of aridity in global drylands" and arrives at a statement that "any predicted increase in aridity with climate change will probably reduce the concentrations of N and C in global drylands, but increase that of P". This then was taken up by an EU bulletin that provides science alerts and digests as "increasing aridity will disrupt soil nutrient cycles in global drylands". This may serve as an example how far generalizations and misconceptions can propagate along the science-policy interface and how aware scientist need to be of all the possible meanings behind their results. The first statement is of course correct: this is the result of the co-evolution of climate, soils and ecosystems over thousands of years. The second statement dangerously assumes that these evolutionary products might substantially and functionally change under climate change to resemble other existing soil-ecosystems that can be observed along aridity gradients today.

Using simple examples, the talk explores the fallacies in this scenario. It highlights the importance of the co-evolution of climate and ecosystems for a deeper cross-disciplinary understanding of the interdependence between ecosystem structure and function, and climate. If scientists want to successfully face the challenges of scenario construction under climate change, and of preparing decision makers for strategies towards resilience and management, a stronger cross-disciplinary integration and dialogue are needed.