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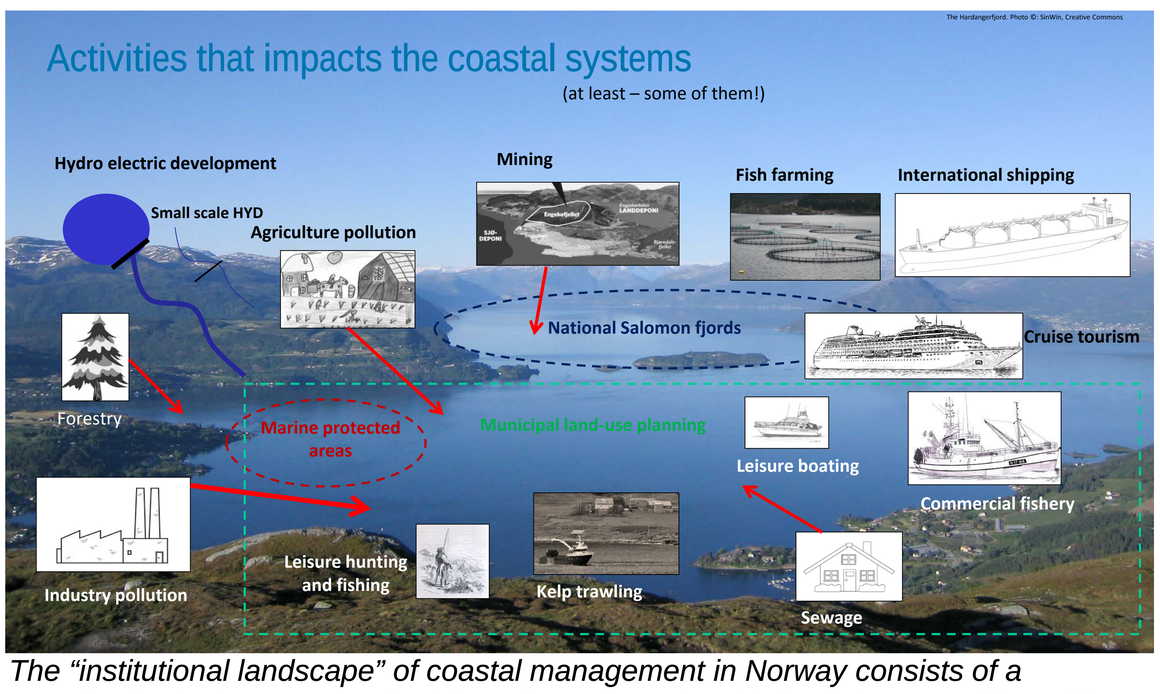
Adapting to Coastal Ocean Acidification – a "wicked problem" for coastal governance?

The Norwegian government has stated an objective to achieve 'blue' growth in the coastal zone in accordance with criteria for environmental sustainability. A rising challenge when pursuing this is ocean acidification (OA), which will have increasing and profound impacts on marine life. The pH of surface waters in the Norwegian Sea has decreased significantly over the past 30 years, and projections show that by 2050 the oceans could be more acidic than in 25 million years on a global scale. In order to maintain and expand coastal activities while ensuring resilience of coastal activities, governance needs to adapt to emerging changes including OA. This poster explores how different institutional elements may enable or constrain adaptive governance in relation to complex socio-ecological challenges such as climate change and OA.

Institutional systems involved in coastal management in Norway

The Norwegian coastal zone is governed by various state agencies, based on sector legislation, and by municipalities and county councils based on the Planning and Building Act (PBA). The municipalities have primary responsibility for spatial planning in the coastal zones and face significant pressure from increased "piece by piece" construction on land, and accelerated increases in aquaculture facilities and production sites (Hersoug & Johansen 2012).

The main problem in Norwegian coastal zone management is the weak coordination across municipal and county borders and across state governance actors (Hovik & Stokke 2007), and incorporating adaptive co-management into formal coastal planning processes may prove challenging. There is, however, a scope for less institutionalized, social networks, multiple stakeholder collaboration and enhanced management of specific coastal resources (Olsson et al. 2004) or problem areas such as OA.



The "institutional landscape" of coastal management in Norway consists of a complex institution pattern of public, private, formal and informal actors with a wide range of interests and investments.

Adapting Coastal Zone Management to Ocean Acidification - AcidCoast

Achieving "blue growth" will require a strengthening of the coastal zone management in order to maintain and further expand the capacity for increased activities (e.g. aquaculture, shellfish, kelp production>, tourism), as well as ensuring that coastal ecosystems and services are resilient to the increasing environmental impacts.

The knowledge of OA and especially OA impacts in Norwegian coastal areas is limited and it is necessary to produce new knowledge through regional and thematic case studies, and new, targeted physical OA measurements and modelling.

The AcidCoast project will offer suggestions on how to make adaptation to OA a tangible management issue, and identify ways to improve institutional capacity for such adaption to take place in Norwegian coastal management systems.

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In order to establish the complex and interacting impacts and required responses to OA in coastal zones a case study approach is needed. Two case areas will be developed in Hardanger and Lofoten with coastal areas under pressure from multiple use, high economic importance, high biodiversity and where relevant sectors are present.

Learning from experiences – but which?

Coastal management in Norway involves a very complex institutional pattern. To enable adaptive governance in relation to the complex socio-ecological challenges related to OA, drawing on experiences from the institutional capacity for climate change adaptation more broadly will be necessary, but also challenging. Where climate change adaptation to some extent can rely on historic experiences with handling extreme events, there are no experiences with how to deal with the effects of OA.

There are, however, lessons to be learned from existing governance mechanisms in dealing with complexity and variability which may be applied to emerging challenges such as OA, including for example, multi-actor dialogue and collaboration. Perhaps could also research-based knowledge on the increasing pressures in the coastal zone, combined with experiences from implementing policies of the EU Water Framework Directive, help explore how to meet the OA challenges facing coastal industries and communities.

Lessons learned regarding successful climate change adaptation	Relevance for coastal acidification	Contribution from AcidCoast
Knowledge on the impacts of climate change and sum-effects of CC and other drivers and stressors	Currently a low level of knowledge on CA	Will be addressed (at least to some extent)
Access to high-quality downscaled scenarios can be crucial (but also an excuse for non-adaptation)	Possible to attain for the case of CA?	Will be addressed
The use of local knowledge (if this still exist…)	Does such knowledge exist?	Not relevant?
Adapting to current climate conditions can inform about CCA and prepare society for CC	No previous experience of adapting to CA	Not relevant?
The key role of the local level of governance	Also the case here?	Will be addressed
Lack of trans-sector co-operation as a major barrier	Crucial challenge also for CA adaptation	Will be addressed
National standards, clear policy signals and sufficient economic support is crucial	No tradition in addressing CA (BUT acid rain lessons might be relevant)	Will be addressed
The existence of well-functioning boundary organizations	No clear single candidate?	Will be addressed
The adherence to "predict-then-act" as a modus operandi in CCA is a major barrier	Appears to be particularly relevant for the case of CA	Will be addressed
Local incidents mobilize local support for prioritizing CCA	Can CA trigger «local incidents» ?	Not relevant?
The existence of local «fire soles»	Also the case here?	Will be addressed