Arctic fjord socio-ecological systems: Drivers of change

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Arctic fjords serve as a point of confluence between land and sea. They are also the point at which the highest levels of human habitation and natural productivity intersect. The Arctic is however changing extremely rapidly, requiring that the monitoring and reporting of these changes keep pace. But what exactly is it that is changing? Or more complexly, which changes are affecting what? To answer these questions a broad team of experts was assembled under the FACE-IT consortium to investigate the drivers of change to socio-ecological systems in Arctic fjords.

Finding the drivers of change

A survey was conducted amongst the experts within FACE-IT on what types of data (social and natural) were most important when studying change in Arctic fjords. This process created a long list of potentially important drivers (QR right), which were used to guide the review of available literature in the space.

Making all data available

After multiple rounds of deliberation the key drivers of change were refined down to a manageable length, and all in situ sampled data available for these drivers were sourced and amalgamated. This dataset was published open access and may also be queried via a user interface constructed by FACE-IT (QR right).

Which changes are affecting what?

Five categories were defined, each containing two or three drivers of change:

- Cryosphere: Sea-ice, Glacier mass balance, Terrestrial runoff
- Physics: Seawater temperature, Salinity, Light
- Chemistry: Carbonate system, Nutrients
- Biology: Primary production, Biomass, Species richness
- Social: Governance, Tourism, Fisheries

Each of these drivers of change are themselves an important facet of the overall socio-ecological fjord system, and most drivers have multiple, often complex interactions with others. Some of which, such as light penetration into fjord waters, are both very important to understand, and yet very difficult to project into the future.

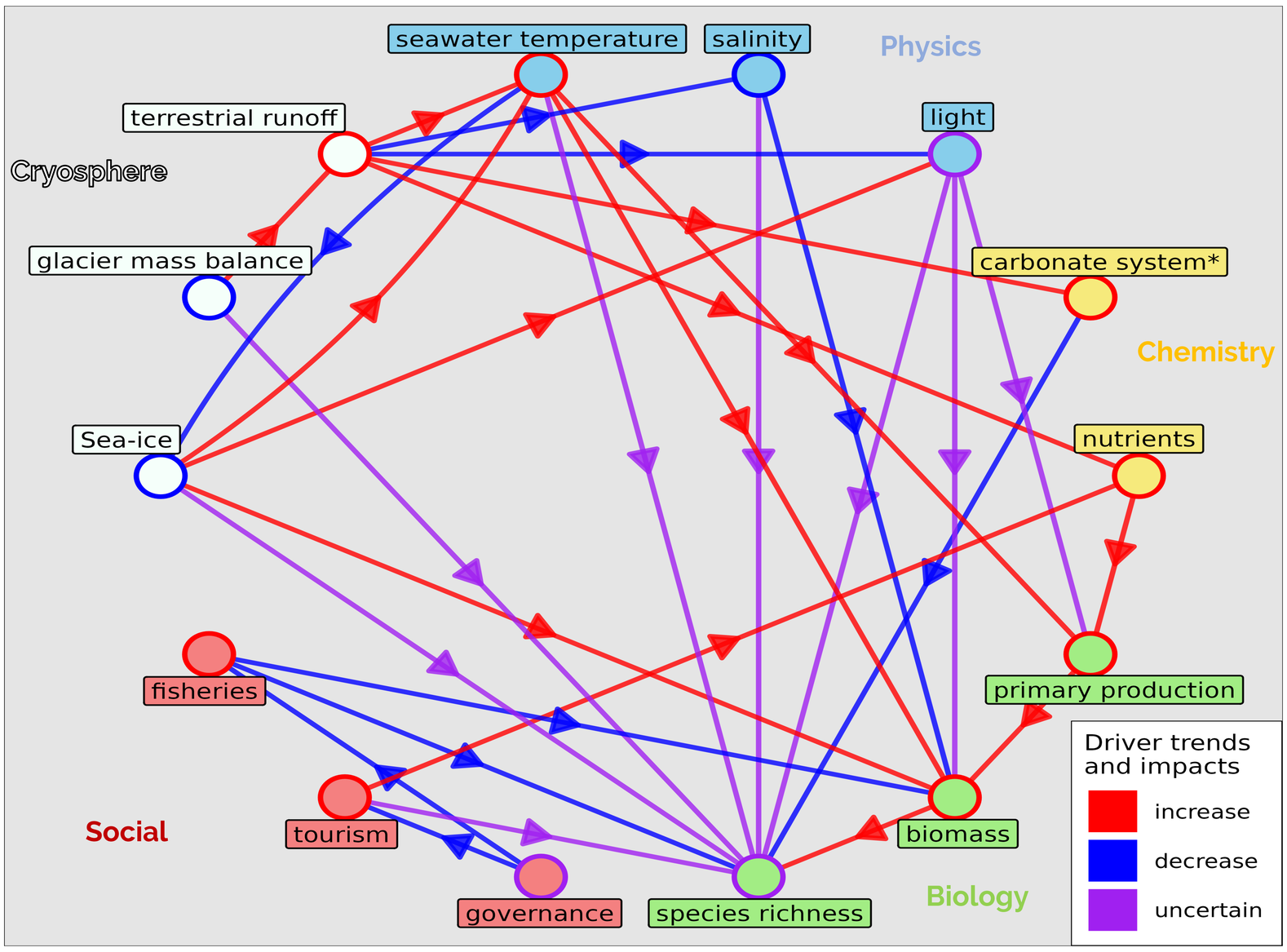

Fig. 1 The interconnections between different drivers of change for socio-ecological Arctic fjord processes according to the available literature. The centre colour of the dots show the category of the drivers, and the border colour shows the direction of the long-term change. Arrows between dots show the direction of the relationship, and the colour shows if these are driving increases or decreases (or uncertain).

We are providing a framework for future studies on any of the facets of change within Arctic fjord socio-ecological systems. The review publication (QR right) provides the necessary literature background to explain and prioritise the importance of the many drivers of change. The connected dataset provides researchers with the necessary data foundation to begin studying the historic state of the primary drivers presented here.

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FACE-IT has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869154.