Climate Change Adaptation Planning for Northwest Skeena Communities
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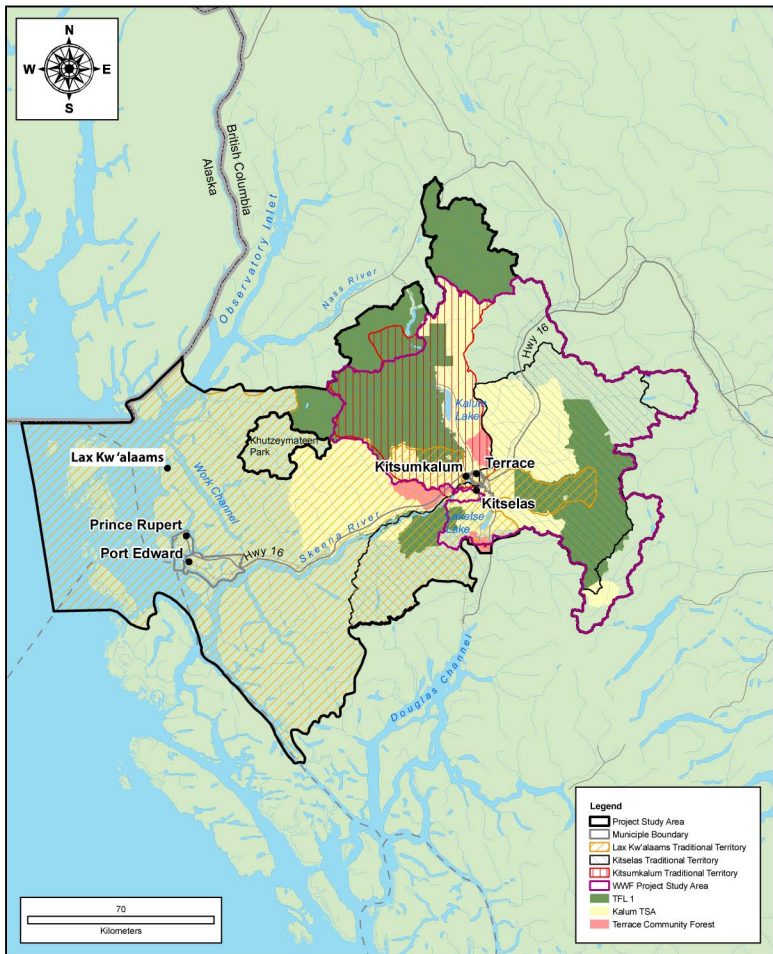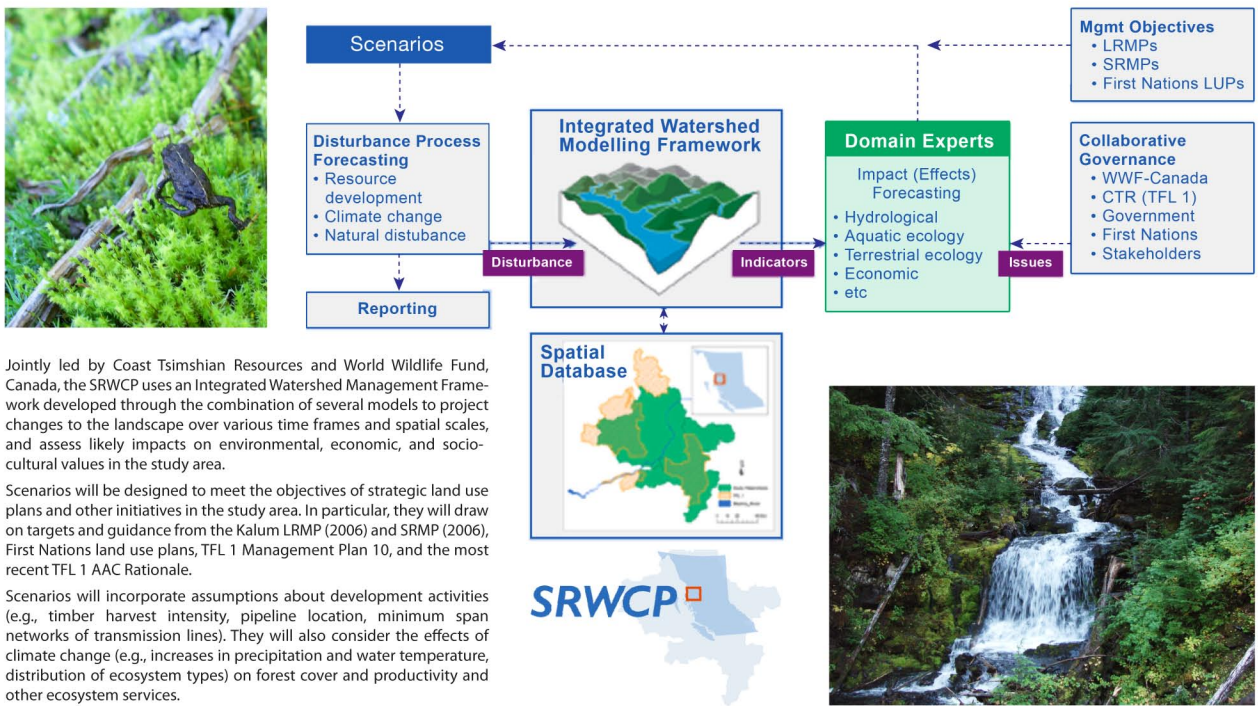# Skeena River Watershed Conservation Project

Study area

THE STUDY AREA

The study area for the FFESC project and the SRWCP study area contained within it, encompasses the ecologically, culturally, and economically significant North West Skeena River Watershed including Tree Farm License 1 (TFL-1), Forest License 16835 (FLA-16835), and their Non-renewable Forest and Range AAC on the coast. Also included are future Kitselas and Kitsumkalum Non-renewable Forest and Range AAC and the connecting forests and watersheds that compromise about 20 000 square kilometers. The First Nations communities of Lax Kw'alaams (formerly Port Simpson), and Kitsumkalum, along with the Municipalities of Terrace and Prince Rupert are the focus of sociological research.

An interdisciplinary approach to integrated adaptive management of natural resources and community values

Coast Tsimshian Resources (LLP) and its managing operator Brinkman Forests, are leading two interrelated and interdisciplinary research projects in collaboration with a range of experts, academics, NGOs, and local stakeholders. Collectively, the FFESC funded 'Climate Change Adaptation Planning for Northwest Skeena Communities' Project (CCAP), and the RAC funded 'Skeena Rivers Watershed Conservation Project' (SRWCP), seek to answer the following questions:

- What are the potential impacts of different climate change and land use scenarios on the water, fisheries, forest and non-timber forest values and resources of communities in the NW Skeena region?
- How could climate change impact the cultural, social, and economic values of communities and stakeholders?
- What is the capacity for communities and stakeholders to mitigate and adapt to potential climate change scenarios?
- How could natural resource and land management systems be restructured to promote ecosystem resilience while optimizing development in light of potential climate change impacts?

Answering these questions and developing the tools with which to achieve the adaptation goals and ecosystem resilience necessary for long-term socio-economic and cultural sustainability, requires an approach that goes beyond the use of contemporary forest-estate models to analyze the impact of land-use and management on critical ecosystem functions and non-timber forest values.

Sociological research and community engagement activities inform the input of traditional ecological knowledge and community values into biophysical models, and create opportunities for shared learning experiences between researchers and community members.

Looking Forward

These projects will provide the foundational datasets and models towards our goal of a Management Options Analysis Tool for Adaptive Integrated Development (MOAT-AID). This will be used to optimize the co-management of timber and non-timber forest values. This will be a critical step toward the restructuring of land-tenure and governance systems to ensure the maximum benefit to human and natural ecosystems.

This poster describes the study area and the multiple layers of these projects. The expanded methodologies and preliminary findings from each phase are presented in individual posters.

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## Skeena River Watershed Conservation Project

Jointly led by Coast Tsimshian Resources and World Wildlife Fund, Canada, the SRWCP uses an Integrated Watershed Management Framework developed through the combination of several models to project changes to the landscape over various time frames and spatial scales, and assess likely impacts on environmental, economic, and sociocultural values in the study area.

Scenarios will be designed to meet the objectives of strategic land use plans and other initiatives in the study area. In particular, they will draw on targets and guidance from the Kalum LRMP (2006) and SRMP (2006), First Nations land use plans, TFL 1 Management Plan 10, and the most recent TFL 1 AAC Rationale.

Scenarios will incorporate assumptions about development activities (e.g., timber harvest intensity, pipeline location, minimum span networks of transmission lines). They will also consider the effects of climate change (e.g., increases in precipitation and water temperature, distribution of ecosystem types) on forest cover and productivity and other ecosystem services.

From research to practice
Management tools for decision makers

MOAT-AID
Management Options Analysis Tools for Adaptive Integrated Development
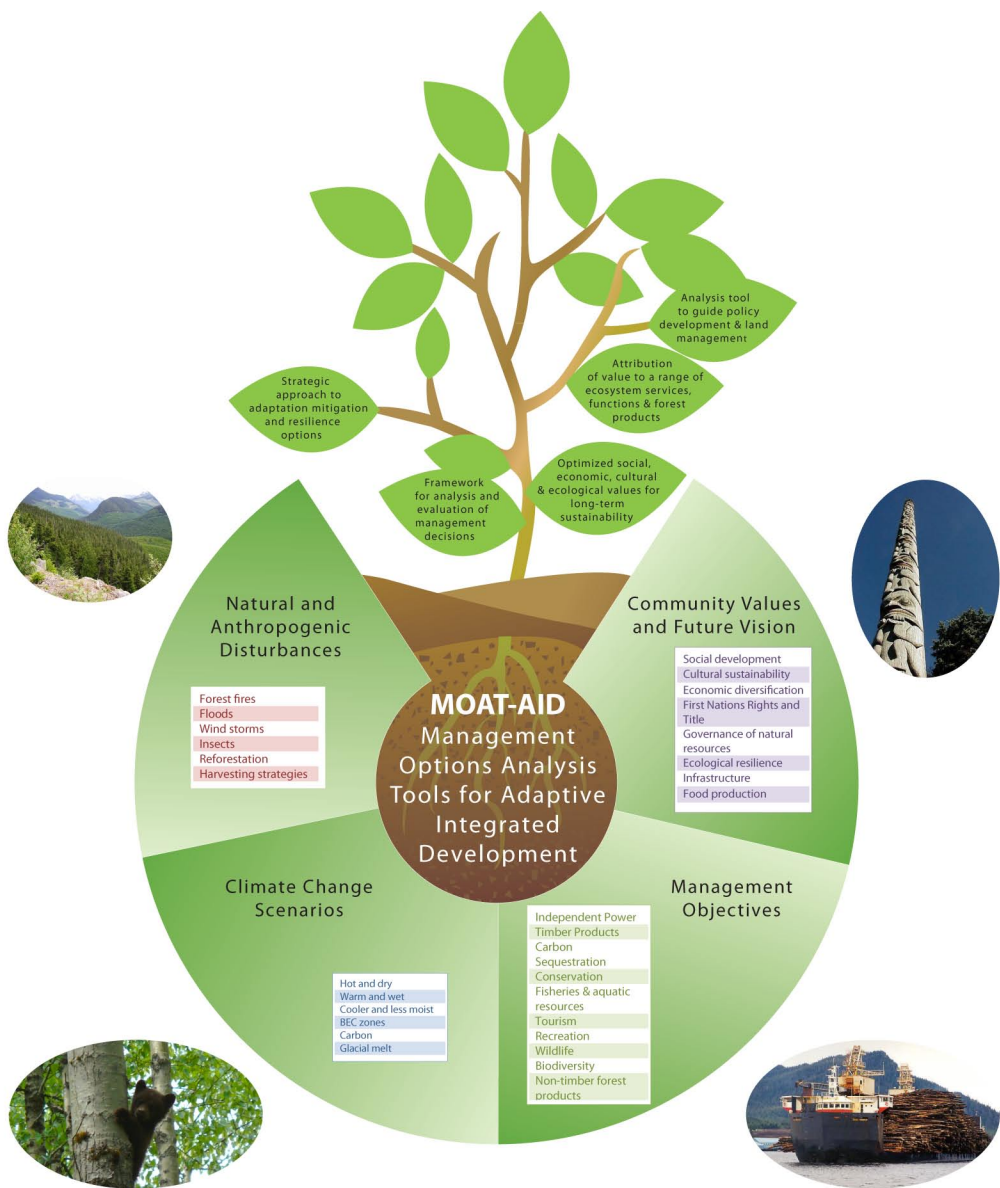
MANAGEMENT OPTIONS ANALYSIS TOOL FOR ADAPTIVE INTEGRATED DEVELOPMENT (MOAT-AID) OF FOREST, WATER AND NON-TIMBER FOREST VALUES.

This work reveals the importance of non-timber forest products and values to local culture and economy, as well as the the health of ecosystems. Brinkman Forests is leading efforts to mobilize the findings of this research through the development of a Management Options Analysis Tool for Adaptive Integrated Development (MOAT-AID). The MOAT-AID will be based on the expansion of the Integrated Watershed Management Framework and informed by findings from each phase of the FFESC project.

Using a combination of optimization and simulation approaches, the MOAT-AID will support regional stakeholders and communities seeking to optimize socio-economic development and ecological adaptation through the use of multiple-value scenario planning. It is anticipated that this tool will be a valuable asset to decision makers in the negotiation of innovative governance and land management systems that will be necessary to optimize development and ecological resilience. Work has commenced to identify gaps and gather data necessary to pilot this tool in the Lakelse watershed as a prerequisite to replicating the tool across the broader study area and other regions.

Sociological research and community engagement
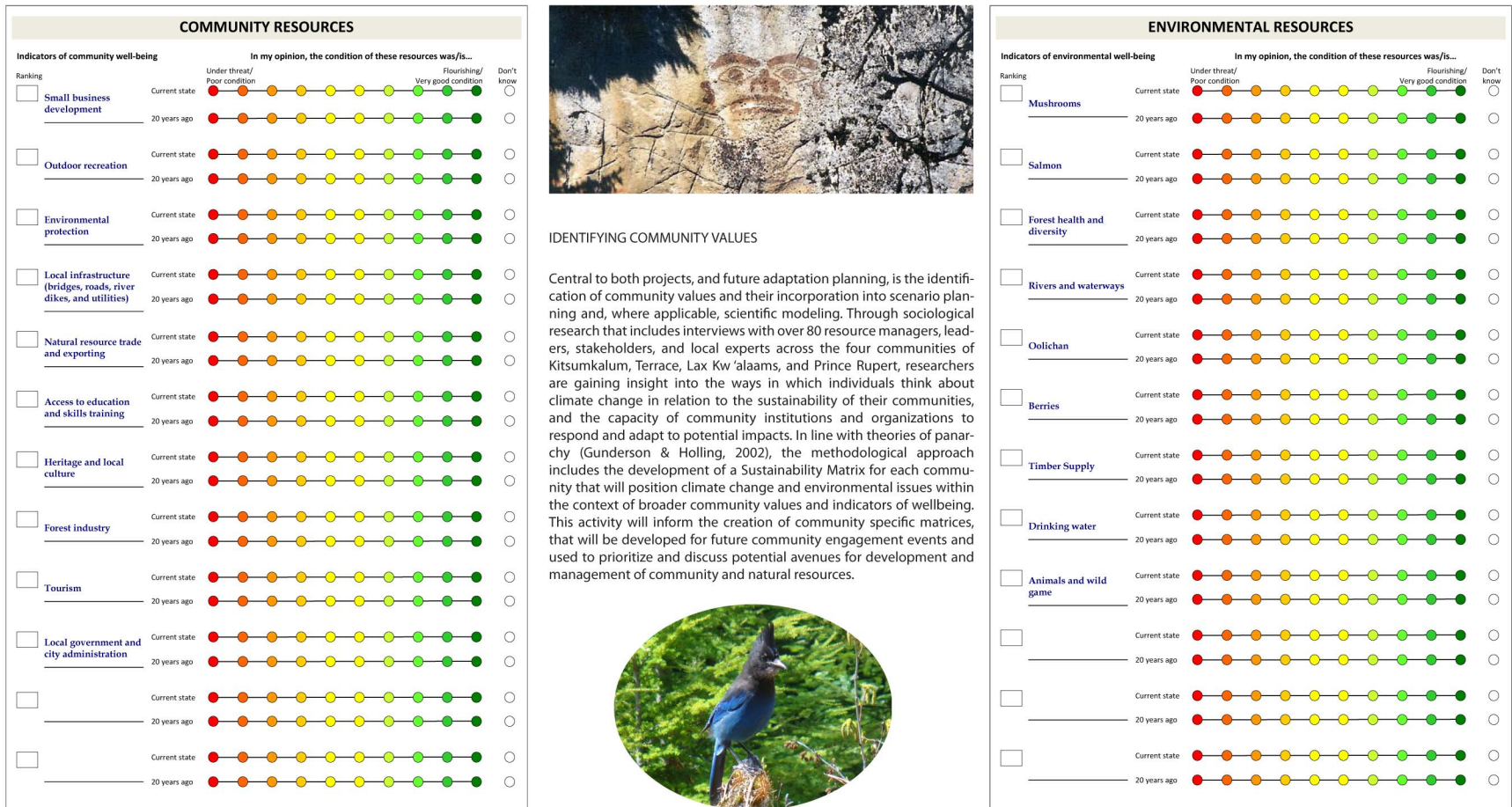
IDENTIFYING COMMUNITY VALUES

Central to both projects, and future adaptation planning, is the identification of community values and their incorporation into scenario planning and, where applicable, scientific modeling. Through sociological research that includes interviews with over 80 resource managers, leaders, stakeholders, and local experts across the four communities of Kitsumkalum, Terrace, Lax Kw'alaams, and Prince Rupert, researchers are gaining insight into the ways in which individuals think about climate change in relation to the sustainability of their communities, and the capacity of community institutions and organizations to respond and adapt to potential impacts. In line with theories of panarchy (Gunderson & Holling, 2002), the methodological approach includes the development of a Sustainability Matrix for each community that will position climate change and environmental issues within the context of broader community values and indicators of wellbeing. This activity will inform the creation of community specific matrices, that will be developed for future community engagement events and used to prioritize and discuss potential avenues for development and management of community and natural resources.

**SCENARIO PLANNING AND COMMUNITY ENGAGEMENT**

Ownership over tools, data, and decisions, are key in encouraging local buy-in and support for climate change initiatives. Input from community members will also be key in formatting the presentation of scientific data.

Community Advisory Boards will be formed by interested local participants and provided with a suite of tools and data that can be applied to local decision making processes in the future. These Community Adaptation Tool-kits will be expanded on through future research initiatives.

The findings derived from each phase of this project will be integrated through a scenario planning process that considers multiple climate scenarios, management options for forestry and fisheries, and identified community values and priorities.

Scenario planning in this way provides an opportunity for researchers and community members to engage in shared learning experiences, combining scientific research with traditional ecological knowledge, and encouraging innovative solutions for climate change adaptation based on scientific knowledge and community input.

By establishing baseline datasets and indicators now, management decisions can be evaluated and learned from in the future, creating opportunities for constant improvement and the input of new information.

Integration of Community Values and Traditional Ecological Knowledge Into Scientific Research Process
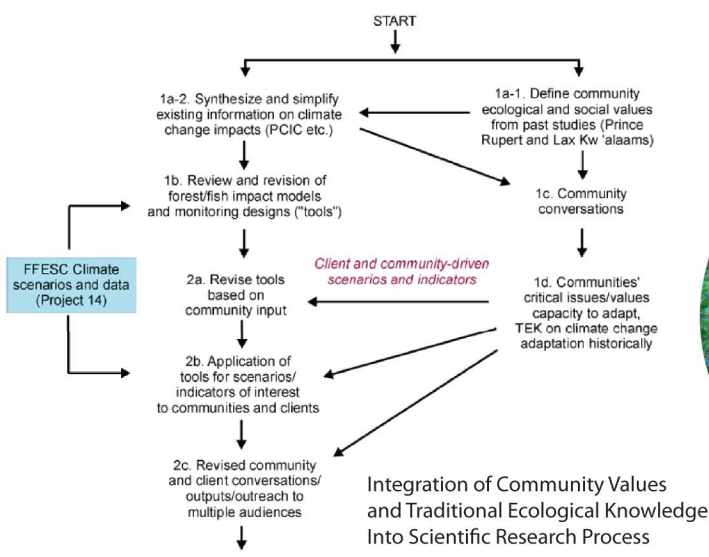
Fisheries sensitive watersheds

Situated within the greater Skeena Watershed, the Lakelse Watershed system has historically been a major producer of sockeye, coho, and pink salmon, among numerous other fish species. Traditional use of the area by the Lax Kw'alaams, Kitselas and Kitsumkalum First Nations dates back more than 5000 years (Skeena Fisheries Commission, 2002). Significant forestry values, along with recreational activity, make Lakelse watershed an important source of growth for local economies, but also increase the vulnerability of the area to anthropogenic disturbance.

The Lakelse Watershed meets the Fisheries Sensitive Watershed criteria for designation under the Government Actions Regulation which derives its legal authority from the Forest and Range Practices Act. The Lakelse watershed has been selected to pilot a FSW Monitoring Framework to evaluate the effectiveness of regulations and protocols governing land-management for the protection of FSWs. The FFESC project will support the development and expansion of the monitoring protocol by incorporating climate change indicators.

Many of the indicators associated with watershed health can be linked to both land management, including forestry operations, and to climate change. For example, variations in peak flow can result from harvesting operations, snow and glacier melt, shifts in precipitation, or any combination of these and other factors.

Differentiating between the impacts of climate and local management activities will assist communities and resource managers in decision making using integrated modeling scenarios that allow evaluation of future conditions based on management decisions today. Modelling and scenario planning facilitates the input of local values, empowering local decision makers to strategically approach management operations based on the integrated assessment of a range of ecosystem, socio-cultural, and economic values.
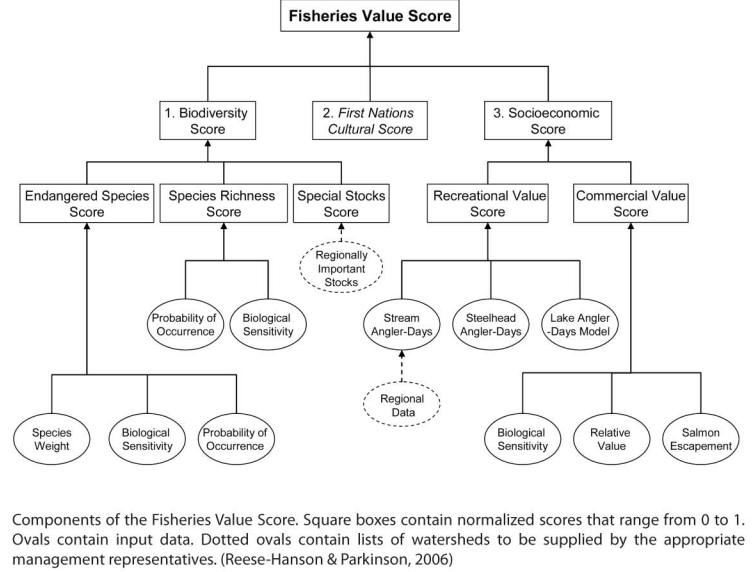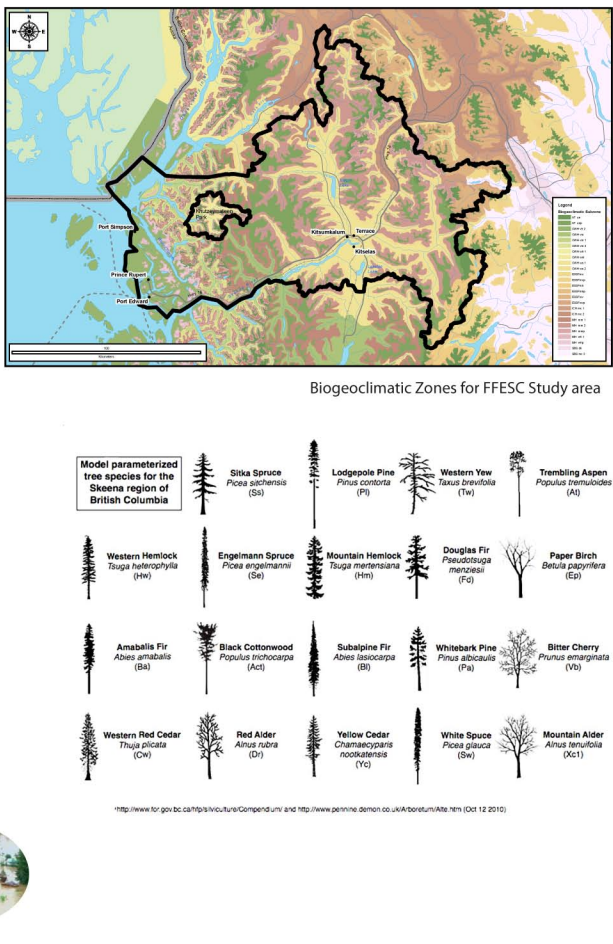

Fisheries Value Score

Components of the Fisheries Value Score. Square boxes contain normalized scores that range from 0 to 1. Ovals contain input data. Dotted ovals contain lists of watersheds to be supplied by the appropriate management representatives. (Reese-Hansen & Parkinson, 2006)

Dynamic global vegetation modelling

Relatively little is known about the potential future impacts of climate change in the Skeena region. That said, the communities of the Skeena are vulnerable to disturbances and disasters, such as floods and fires which may increase in severity and frequency. Understanding these risks provides communities with an opportunity to mitigate and adapt to future hazards.

Regional climate scenarios can also be used to inform decision making for resource managers. Dr. Jed Kaplan and Dr. Joe Melton of Ecole Polytechnique Fédérale de Lausanne have parameterized data for 19 regional tree species and are using the LPJ-GUESS dynamic global vegetation model (DGVM) to show possible shifts in species distribution and growth using IPCC climate scenarios and natural and anthropogenic disturbances. By inputting rules around anthropogenic disturbances and management options, such as harvesting, carbon sequestration, and silviculture, this model can identify the species composition of future forests under certain conditions, as well as solutions to facilitate adaption of tree species through specific management activities.

Biogeoclimatic Zones for FFESC Study area