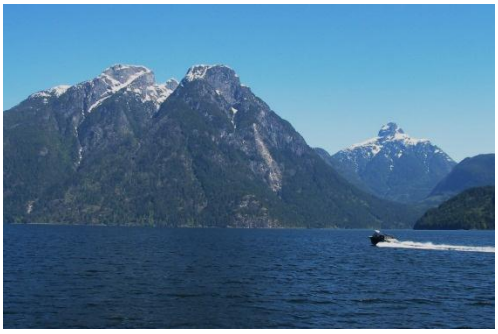
Marine Spatial Planning on Vancouver Island

A Collaborative Approach to Marine Spatial Planning

The Natural Capital Project (NatCap) is working with the West Coast Aquatic Management Board (WCA), a public–private partnership among government agencies and diverse local stakeholders, in its creation of spatial plans for Barkley and Clayoquot Sounds on the West Coast of Vancouver Island (WCVI). NatCap is working with WCA to iteratively map and analyze environmental services across realistic zoning scenarios, which is helping decision makers accommodate varied priorities for using marine resources. On WCVI our approach and tools support an open planning dialogue among government, coastal communities, First Nations, private entities, and business interests.

Stakeholder engagement is critical to understanding the use of coastal ecosystems and their value to people.



NatCap's analysis of the marine environment along WCVI considers multiple stakeholder priorities. These include balancing commercial interests (e.g., shipping, mining, logging and aquaculture), developing tourism and recreation sectors, investing in renewable energy generation, as well as a cultural desire to sustain the tranquil beauty and quality of life on WCVI.

NatCap scientists developed new models for Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) software to analyze ecosystem benefits from coastal environments along WCVI and compare them across scenarios of human use. Spatially explicit outputs identify areas where diverse benefits of ecosystems are produced, and biophysical and economic valuation models quantify their service to coastal populations and other stakeholders. InVEST enhances WCA's planning discussions by offering clear metrics with which to compare trade-offs among services and minimize conflicts involving damaging uses and sensitive habitats.

InVEST outputs enable collaborative decision-making processes

Our work in Lemmens Inlet on the coast of WCVI demonstrates how InVEST is used as an effective decision support tool in marine contexts. West Coast Aquatic conducted stakeholder interviews to identify the values and visions that locals have for development. WCA then translated these narrative visions into spatial scenarios representing current and potential future uses of coastal areas. InVEST ecosystem service modeling results from this relatively fine-scale application on Lemmens Inlet have informed early iterations of marine plans for WCVI and will contribute to final versions in 2013. The region's integrated planning process illustrates how InVEST can be used to shape dialogue, inform decisions, and bring more voices to the decision-making table.

Results

Trained Professionals in InVEST software: We designed InVEST models for marine environments according to the needs of our partner, West Coast Aquatic, government objectives, and the values of indigenous communities. With local planners and stakeholders in the driver's seat, InVEST outputs will inform decisions with direct impact on marine ecosystems and encourage transparency in managing resources.

Produced Multi-Scale Scenario Maps for Marine Spatial Planning: Local zoning maps provided realistic scenarios for coastal populations. For larger-scale planning questions, West Coast Aquatic is using outputs from InVEST and other tools to compare a wide range of value metrics across various management scenarios.

Published Paper on Marine Spatial Planning methods: In 2012 NatCap scientists led a collaborative paper presenting new applications of InVEST for marine environments, featuring our work in Lemmens Inlet on WCVI.

Developed InVEST Models for marine environments, including:

- **Food from Fisheries**
- **Food from Aquaculture**
- **Coastal Protection**
- **Renewable Energy**
- **Aesthetic Quality**
- **Recreation**
- **Marine Carbon**
- **Water Quality**
- **Habitat Risk**

NATURAL CAPITAL PROJECT:
West Coast Vancouver Island, BC

Ecosystem Services

Seafood: The West Coast of Vancouver Island is known for its salmon, shellfish, and herring fishing areas. InVEST's fisheries and aquaculture models are exploring how local seafood supply might be affected by different management alternatives.

Recreation & Tourism: Vancouver Island is a hub for outdoor activities such as world-renowned backpacking, whale watching, kayaking, and surfing. InVEST explores how changes in marine habitats and tourism infrastructure impact visitation rates.

Coastal Protection: Coastal habitats such as seagrass beds and marshes dampen the power of waves and reduce erosion and flooding. InVEST's coastal protection models map areas vulnerable to coastal hazards and quantify the protective role of natural habitats.

Cultural Services: The First Nations and other residents of Vancouver Island value the scenic beauty and cultural significance of their coastal resources. InSEAM, NatCap's interactive mapping tool, can aid in the identification of cultural and historical areas important to stakeholders, and InVEST can explore how alternate management schemes affect their scenic vistas.

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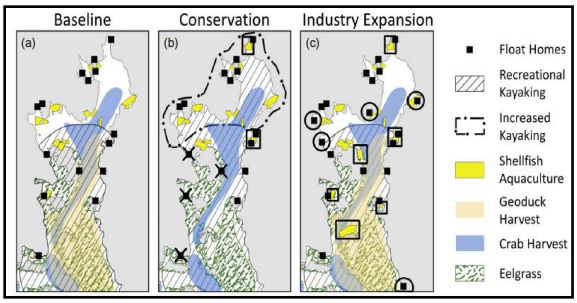
West Coast Aquatic: Spatial Scenarios for Lemmens Inlet

Lemmens Inlet is an important tourist destination on the coast of Vancouver Island with a long history of stewardship by First Nations and extractive activities such as shellfish harvest and logging. Residents reported their interest in balancing human uses such as seafood harvest (wild geoduck, clam, crab harvest, and cultured oysters), float homes (houseboats with little to no sewage treatment), and recreational activities such as kayaking and wildlife viewing. The figure below shows three alternative management scenarios developed by WCA:



(a) Baseline: No changes to current uses or zoning;

(b) Conservation: Restrict float homes and aquaculture near eelgrass beds;

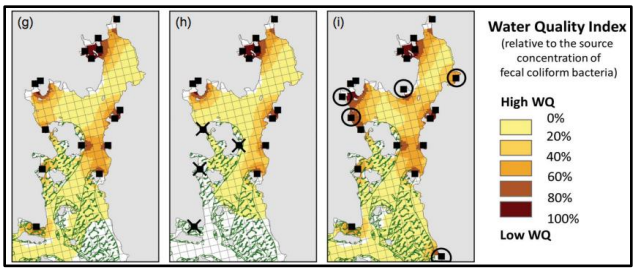
(c) Industry Expansion: Expand float home leases and oyster tenures, permit geoduck harvesting.

Modeling Key Ecosystem Services with InVEST

NatCap mapped and valued several key ecosystem services under the scenarios outlined by WCA. The following InVEST models were applied in Lemmens Inlet:

- **Shellfish Aquaculture**, estimating the production of Pacific Oysters
- **Recreation**, quantifying the use of kayaking routes and float homes
- **Habitat Risk Assessment**, comparing risks to habitats from human activities
- **Water Quality,** estimating the concentration of bacteria from float homes

Below, InVEST spatial outputs reflect relative change in water quality across WCA's three zoning scenarios. These maps are helping to reduce conflicts within stakeholder discussions by documenting explicit connections between activities, and revealing that careful siting of some controversial activities can reduce environmental impact.



Our analysis indicates that zoning Lemmens Inlet as an ecologically significant area (the 'conservation' scenario) accommodates multiple local objectives. Our results show a 57% gain in the extent of kayaking routes, an 18% increase in the value of the 2011 shellfish harvest from a small increase in oyster tenures, loss of four float homes, a 75% decrease in habitat risk and 32% increase in relative water quality.

Lessons from the Field: Broadening Valuation Metrics

An ecosystem services framework is often equated with economic valuation. However NatCap's work on WCVI demonstrates that a range of value metrics can be useful when interpreting ecosystem services' value. Only one of our InVEST output metrics - shellfish harvest - on WCVI was calculated in dollar values. For stakeholders, NatCap scientists found that absolute values for some services, such as water quality and habitat risk, were unnecessary for stakeholders to compare across scenarios. Instead, relative values that integrate changes over a region are often more meaningful to stakeholders than are multiple point estimates, particularly for broader ecosystem benefits that are not readily monetized.