



Blue Carbon in the Comox Valley: Monetizing the benefits of eelgrass habitat restoration in coastal British Columbia

Christine Hodgson, North Island College, Courtenay British Columbia, Canada
On behalf of the Blue Carbon Team, Comox Valley Project Watershed Society



What is Blue Carbon?



Blue Carbon refers to the long-term storage of carbon by marine and aquatic plants. Eelgrass, *Zostera marina*, is of particular interest for its role in this activity.

Eelgrass beds are widely recognized as important habitat for estuarine inhabitants and for foreshore resilience. However, before eelgrass habitat can be valued additionally for the carbon it stores, fundamental research is required to link the two. This activity is being pursued by a volunteer Community Science group, called the Blue Carbon Team.

Where is this Community Science Project taking place?

The K'omoks Estuary is situated on eastern Vancouver Island, British Columbia, at approximately 49°N latitude, and covers almost 2000 ha. Three rivers, the Puntledge, the Tsolum and the Trent, flow into the estuary providing a catchment area of approximately 60,000 ha. The estuary is bordered by the City of Courtenay, the Town of Comox, the Comox Valley Regional District and the K'omoks First Nation.

Based on its size, habitat type and rarity, herring spawn occurrence, waterfowl use, and intertidal biodiversity, the K'omoks Estuary is listed as a Class 1 Estuary and ranks 3rd in BC in terms of potential for sequestering carbon (Campbell, 2010; Ryder, et al., 2007). For this reason the K'omoks Estuary is an ideal location to pilot the development of Blue Carbon protocols.



Figure 1: Location of K'omoks Estuary on eastern Vancouver Island, British Columbia, Canada.



Who is Involved?

The Blue Carbon Team is part of a larger community organization called Comox Valley Project Watershed Society (CVPW), whose mission is to promote community stewardship in the Comox Valley watershed through education, information and action.

The Blue Carbon Team consists of professional and volunteer community members led by Dr. Paul Horgen, Professor Emeritus, University of Toronto, with over 35 years of research management experience.

The local K'omoks First Nation has provided their support for eelgrass restoration projects through the 2011 signing of a MOA with CVPW.



Figure 2: The Blue Carbon Team. From left to right, Lora McAuley, M.Sc. (Biologist), Wayne White (CVPW), Paul Horgen, PhD (Chair, CVPW), Kona the guide dog, Royann Petrell, PhD (Scientific advisor), Angela Spooner (M.Sc. Candidate at Royal Roads University), Dan Bowen (CVPW), Tanis Gower, B.Sc. (Biologist), Dave Davies (DFO Community Advisor), Christine Hodgson, M.Sc. (lead scientist), Kathryn Clouston (CVPW), Michele Jones, M.Sc. (Biologist), Caila Holbrook (CVPW) (photo credit: Jennifer Sutherst)

Furthermore, CVPW is part of a MOU with the provincial government (BC Climate Action Secretariat) and Vancouver Island University to work together on the development of Blue Carbon projects in British Columbia. The MOU sets out a goal to have the three parties work together on projects that lead to monetizing estuarine habitat restoration activities by quantifying the amount of carbon sequestered in marine grass habitats and create the sale of GHG offsets from Blue Carbon projects that will be recognized in international markets.

What Do We Hope to Accomplish?

CVPW is a community volunteer organization. But with the assistance of the Province and Vancouver Island University, our goal is to develop a Carbon Verification method for eelgrass beds in coastal BC that can be used by community groups throughout the Province.

We hope to provide baseline information to allow other community groups to estimate the amount of carbon that can be sequestered through habitat restoration projects.

Why is this Research Important?

With hundreds of estuaries along the coastline of BC, Blue Carbon projects could have climate change reduction and adaptation benefits, as well as economic and environmental opportunities, for coastal communities and First Nations.

What Have We Done to Date?

In 2013 and 2014, CVPW received funding for three eelgrass restoration projects to plant over 4,000 m² of eelgrass in K'omoks Estuary. During these projects, preliminary data was collected to quantify baseline eelgrass biomass in intertidal areas and will be used to as part of M.Sc. Project. (See poster by A. Spooner - A Blue Carbon Case Study: Restoration of K'omoks Estuary Eelgrass (*Zostera marina*) Beds: Towards a Marine Sediment Carbon Sequestration Rate Protocol).

In 2014, CVPW received a grant for \$230,000 from the North American Partnership for Environmental Community Action (NAPECA) to quantify the amount of carbon stored in sediments in eelgrass and saltmarsh beds and compare it to barren areas. This two-year grant is shared with Squamish River Watershed Society.



Figures 3a & 3b: Collecting sediment cores for radioisotope and C/N analysis.

Six deep cores (up to 70 cm) were collected in the summer of 2014 in intertidal and subtidal eelgrass beds and nearby barren sites. The samples are being analyzed to determine total carbon and C/N ratios as well as radioisotope analysis (²¹⁰Pb/²²⁶Ra) to determine rate of sedimentation and age of sediments. An additional 40 shallow cores (30-35 cm) were collected to provide an estimate of variability of total carbon and C/N ratios in the sediments. Expert advice on interpreting the data is provided by Dr. Sophia Johannessen of Fisheries and Oceans Canada.

All analyses will be completed by the end of 2014. The results will provide a baseline to determine the difference in the amount of carbon stored in sediments beneath vegetated sites vs. barren sites. This information will then be used to develop a protocol that can be used by other community organizations across western North America.

What Needs to be Done?



The initial Blue Carbon GHG protocol will focus on direct measurements of carbon sequestration in sediments below eelgrass and salt marsh meadows. Based on the results, an appropriate methodology will be designed so that other community groups can estimate the total amount of carbon stored in sediments and measure the rate of carbon sequestration.

In subsequent years, barren sites that were planted with eelgrass will be monitored to assess the change in the amount of carbon stored in the sediments. This long-term monitoring is necessary to validate the efficacy of eelgrass and salt marsh meadows to sequester carbon.

What can a Community Science Group Accomplish?



Figure 4: Volunteers transplanting eelgrass in K'omoks Estuary, summer 2014.

The Blue Carbon Team will continue the project in 2016, focusing on salt marsh habitats. With a team of dedicated volunteers and scientific advisors, and the assistance of the Province and Vancouver Island University, we believe we can provide valuable baseline information toward the development of a protocol that can be used by other community groups to monetize their habitat restoration and/or protection projects.



Figure 5: K'omoks Estuary Eelgrass Assessment, 2014. Study sites for eelgrass research are indicated as well as extend of intertidal eelgrass beds.

