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The K'omoks Estuary - A Blue Carbon Pilot Project
Comox Valley Project Watershed Society

Project Summary
Part I. Description

Participating organizations

- Comox Valley Project Watershed Society
- K'omoks (Courtenay River)
- Squamish River Watershed Society

Background or problem statement
The Comox Valley Project Watershed Society (CVPWS) and the Squamish River Watershed Society (SRWS) received funding from NAPECA to work on developing a community-based initiative for carbon assessment in estuaries.

CVPWS conducted research with the goal to develop a protocol suitable for coastal communities on the Pacific coast to identify rates of carbon sequestration in estuaries and to restore eelgrass and salt marsh habitats lost due to human activities. It is hoped community-based projects will be recognized for the carbon they sequester and for the ecosystem services that these habitat restorations provide including shoreline protection.

General description of the project
The protocol included four components: mapping, habitat restoration, estimating carbon stores and estimating carbon sequestration rates. As planned, CVPWS developed field methods that could be easily followed by other community groups to carry out these activities. In addition, after consulting with the CEC Director for Blue Carbon activities, we initiated a small preliminary study that led to some important conclusions with respect to eelgrass detritus distribution using some novel and new approaches.

Description of outcomes and follow-up
CVPWS determined mapping could be accomplished using a handheld GPS unit and walking the upper and lower boundaries of estuarine habitats. This method proved to be very accurate when compared with air photo interpretation.

CVPWS developed a protocol for collecting sediment cores that would be suitable for other community groups to carry out. Whereas some limited analyses can be completed by community groups, it is recommended that all sediment analyses be conducted by a commercial laboratory.

Eelgrass habitat restoration methods developed by Precision Environmental Ltd. were found to be cost effective and suitable for community groups. The methods were modified for this project and achieved a success rate as high as 95% survival.

CVPWS developed a method to restore salt marsh habitat by constructing 'barrier islands'. The areas were allowed to settle for one year and then were planted with 6s species of native salt marsh vegetation. Over 500 m2 of new salt marsh habitat was created. This methodology provided more than double the edge habitat than the standard bench methodology and also created intertidal habitat channels.

The protocol for each of these activities was written into the attached final report.

Project Summary
Part II. Analysis

Successes
In carrying out this work in the Comox Valley, we have been able to use this activity as an educational tool to further inform the general public about the importance of the K'omoks Estuary as a habitat and as a place to store Carbon. For a complete description of activities please see full report: The K'ómoks and Squamish Estuaries: A Blue Carbon Pilot Project Final Report to North American Partnership for Environmental Community Action (NAPECA).

Mapping and Carbon sequestration rates were obtained for the K'omoks Estuary and will contribute to the body of science on Blue Carbon.

This project also involved habitat restoration of both eelgrass and salt marsh beds. There was significant community involvement in the restoration projects.

Methods to carry out habitat restoration and estimate Blue Carbon stores in estuarine habitats were developed and produced as a written document that can aid other community organizations. In addition, our discovery of eelgrass shoreline burial, the role of geology and hydrology on carbon distribution and the potential benefit of utilizing DNA based approaches to monitor where detritus is being distributed offers some new opportunities for study for many communities.

We know where the eel grass sequestered carbon is and we were surprised and delighted to find it in much higher percentages than previously expected.

Challenges
Working in eelgrass meadows that are submerged for the most part presents challenges. As well, we endeavored to find methods that would be satisfactory for other community groups with little technical expertise. However, when working underwater, it is very important to ensure safety for all participants. Therefore, we recommend all underwater work be conducted by certified commercial SCUBA divers. Weather was also a challenge due to currents and tide changes which impacted divers safety. Ocean turbidity made it difficult to see underwater during some periods of the donor stock harvest and planting work. Lead lines were placed for a guide for divers along with corner markers.

When working on the salt marsh areas, construction of the Islands in the tidal areas restricted the available work time periods to as little as 4-6 hours per day. Building the access to the site also took extra time due to ground conditions and tides.

Lessons Learned
There are many ways to carry out mapping of estuarine habitats. Our focus was on methods that were simple and cost-effective. We didn't anticipate that using a handheld GPS unit would provide meaningful results. It was only because we wanted to ground-truth the maps produced using ArcView that we realized just how effective the method was. We used this method in a training session with the K'omoks First Nations Guardians.

Whereas sediment samples can be collected by volunteers, it's important that all sediment analyses be carried out by a commercial laboratory to ensure accuracy of results.

Our Blue Carbon Team of 10 professionals and biologists pooled their experiences to focus on Blue carbon and formed a very special group that knows all the methodologies to develop a protocol that will help understand the where the Carbon is and how to calculate the specific areas. We learned that different areas have different % carbon and it is much more complicated than the previous literature on this subject had noted.

We learned that first priority is to understand the hydrology of the estuary, the hydrology of each stream that enters the estuary and its impacts, as well as the various winter storm events.

This understanding will show where the eel grass detritus will accumulate and be sequestered.

What Next?
The methods developed by CVPWS to collect the baseline information are simple, cost-effective, and don't require advanced technical skills. It is hoped that once shared by NAPECA and CVPWS, other community organizations will take advantage of this protocol to assess their local estuary and identify opportunities for habitat restoration with Blue Carbon benefits. Should communities in either the USA or Mexico attempt to pursue the DNA strategies developed at the very end of this project, any good University collaboration would facilitate this new direction.

Additional grants will be sought to monitor the work completed and to determine additional carbon sequestration over a longer time period. Grants will also be sought to pursue the interesting finding regarding eelgrass burial above the high tide line.

We are presently partnering with the BC Seagrass group and the Hakai Institute participating in workshops and sharing information on eel grass restoration, carbon sequestration and Blue Carbon concepts. CVPW is now recognized as one of the foremost authorities on methodologies regarding sediment sampling for carbon, hydrological and geomorphic reviews regarding carbon movement in estuaries.

For more information about the project please contact:

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