Coastal reed beds in the Baltic Sea and assessment of the potential for use.

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Introduction

Besides of the typical uses that include thatching and insulation, common reed has recently been rediscovered as a possible resource for new types of applications ranging from water treatment to bio-energy production. Assessment of potential for use of common reed requires inventory of reed-bed areas and the biomass that can only be done on the basis of continuous monitoring. Such an observation system is however, fairly rare being missing in most countries of the Baltic Sea Region (BSR). Therefore, a study was initiated within the project COFINNEM to carry out a systematic state assessment of the common reed resources along the coasts of the Baltic Sea including the coastal lagons.

Figure 1. Common reed (Phragmites australis) in Toriški, western Estonia in July 2011 (left) and in Torišuame, northern Estonia in January 2007 (left) (photo by U. Kask)

Methods

An inventory of the reed bed areas and reed biomass was based on the research and national monitoring results and data collected by the partner organisations and relevant institution in the BSR. Data about the reed bed areas along the coast of Denmark was not available. Assessment of the energy potential of above-ground part of reed is based on the available reed biomass data and calorific value of reed with moisture content of 20 %. Estimated capacity for nitrogen removal from water bodies when harvesting the reed biomass is based on the average values for the BSR and the mean annual biomass yield of reed.

Reed bed areas

A rough inventory (Table 1) reveals that the total area of reed in shallow bays and coastal lagons of the Baltic Sea exceeds 350,000 ha. Sweden has by far the largest resources. Large reed beds can also be found in Finland and Estonia.

Table 1: Area of reed-beds in shallow bays and coastal lagons of the Baltic Sea

<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>Reed area (ha)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>Whole coastal area</td>
<td>20-100</td>
<td>U. Kask, unpublished</td>
</tr>
<tr>
<td>Finland</td>
<td>South / South-West</td>
<td>&lt; 30,000</td>
<td>Pitkänen, 2006</td>
</tr>
<tr>
<td>Germany</td>
<td>Mecklenburg-Vorpommern</td>
<td>1,500</td>
<td>Pitkänen et al., 2007</td>
</tr>
<tr>
<td>Latvia</td>
<td>Pape, Liepaja, Izmire</td>
<td>2,600</td>
<td>Niedro, 2011</td>
</tr>
<tr>
<td>Lithuania</td>
<td>Curonian spit</td>
<td>4,995</td>
<td>Balvešienė et al., 2007</td>
</tr>
<tr>
<td>Poland</td>
<td>Puck Bay, Vistula Lagoon, Odra Estuary</td>
<td>1,660</td>
<td>Zaučia J. (ed.), 2008, Hac et al., 2010, personal communication with W. Wichtmann</td>
</tr>
<tr>
<td>Russia</td>
<td>Kaliningrad Oblast</td>
<td>200-300</td>
<td>Estimated based on Chubarenko and Mangomisky, 2008</td>
</tr>
<tr>
<td>Sweden</td>
<td>Southern part of the country</td>
<td>&gt; 230,000</td>
<td>Svensson, 2010</td>
</tr>
</tbody>
</table>

Figure 2. Reed pellets for combustion (Photo by U. Kask)

Reed biomass

The total annual biomass of the above-ground part of common reed in the Baltic Sea is up to one million tonnes assuming that the annual yield of reed varies from 3 to 10 tonnes per ha. The potential annual usable resource constitutes no more than one third of the above-ground biomass in the Baltic Sea and can be much lower in protected coastal areas.

Energy potential

The total energy potential of above-ground part of reed in the Baltic Sea Region is no more than 4 TWh assuming that the average calorific value of reed with moisture content of 20 % is 3.9 MWh/t. Not all of the annual yield of reed can be harvested. Therefore, the real energy potential of reed along the Baltic coasts is lower considering also that part of the reed resource will be used as a construction material.

Nitrogen removal

The extent to which reed beds can improve water quality is dependent on how often and when the reed is harvested. Due to seasonal restrictions limiting the harvesting of reed to winter, the amount of nutrients that can be removed from the system is lower. Usually about 50-100 kg of nitrogen and 5 to 10 kg of phosphorus per hectare can be removed from the natural water system by harvesting the above-ground part of the reed assuming that the mean annual biomass yield of reed is 5 tons/ha. Actual yield that is much lower compared to the maximum decreases the amount of nutrients that can be annually removed by the harvest. Based on the most optimistic scenario, harvesting of reed provides up to one percent of nitrogen reduction, compared to the target level set by the HELCOM Baltic Sea Action Plan.

References


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