Shibetsu River Restoration Project

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Restoration Ecology

• Ecology: the branch of biology that deals with the relations of organisms to one another and to their physical surroundings

• Restoration: the action of returning something to a former owner, place, or condition; returning to a normal or healthy condition
• Restoration Ecology: the application of ecological principles and field methodologies to the successful restoration of damaged ecosystems
Land of Natural disasters

- Earthquake
- Typhoon
- Volcanic eruption
- Flooding
- Land slide
- Tsunami
Flood control in Japan

• Short, steep, flashy rivers

  • 1890’s
    – channel straightening

  • 1980’s
    – increasing interest in biodiversity conservation

  • 1990’s
    – ecological restoration of rivers

This is not a river, but a cataract
Consequences of Degradation

channelization -> reduced habitat heterogeneity -> loss of native fish species

development of agricultural lands -> decreased riparian forests -> loss of native bird species
Pilot Re-meandering Experiment

Before

After

Picture: Knowledge of Stream Ecology Database
Ecological Strategies

• create various in-stream structure
  – depth, velocity, pool-riffle structure

• increase habitat complexity and diversity

• improve biological connectivity
  – salmon upward migration
  – nutrient cycle
## Assessment of Success

<table>
<thead>
<tr>
<th>Variable</th>
<th>Results compared to channelized site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Structure</td>
<td>• more diverse in meandered site</td>
</tr>
<tr>
<td>Primary Production Rate</td>
<td>• higher in meandered site</td>
</tr>
<tr>
<td>Macroinvertebrate Community</td>
<td>• more abundant and diverse (especially in edge)</td>
</tr>
<tr>
<td>Fish Community</td>
<td>• higher biomass in meandered site</td>
</tr>
<tr>
<td></td>
<td>• meandering reach is used by salmonoids</td>
</tr>
<tr>
<td>Daubenton’s bat</td>
<td>• more foraging activity in channelized site</td>
</tr>
<tr>
<td>Variable</td>
<td>Results compared with natural meander/oxbow lake</td>
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<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Physical Structure</td>
<td>• higher overall velocity than natural meander</td>
</tr>
<tr>
<td>Primary Production Rate</td>
<td></td>
</tr>
<tr>
<td>Macroinvertebrate Community</td>
<td>• species existed in K lake were lost</td>
</tr>
<tr>
<td>Fish Community</td>
<td>• change in composition from lentic to lotic</td>
</tr>
<tr>
<td></td>
<td>• did not use meander as a holding habitat</td>
</tr>
<tr>
<td>Daubenton’s bats</td>
<td>• found more in channelized reach due to the</td>
</tr>
<tr>
<td></td>
<td>developed riparian forest</td>
</tr>
</tbody>
</table>
Future Outlook

• Physical structure is likely to develop closer to natural meandering

• Riparian vegetation is likely to develop

• Most of the still water species will not recover

Picture: Knowledge of Stream Ecology Database
What could be done differently

• reduce impact to old-growth riparian forest
• conserve rare species in oxbow lakes

Planning restoration on landscape level