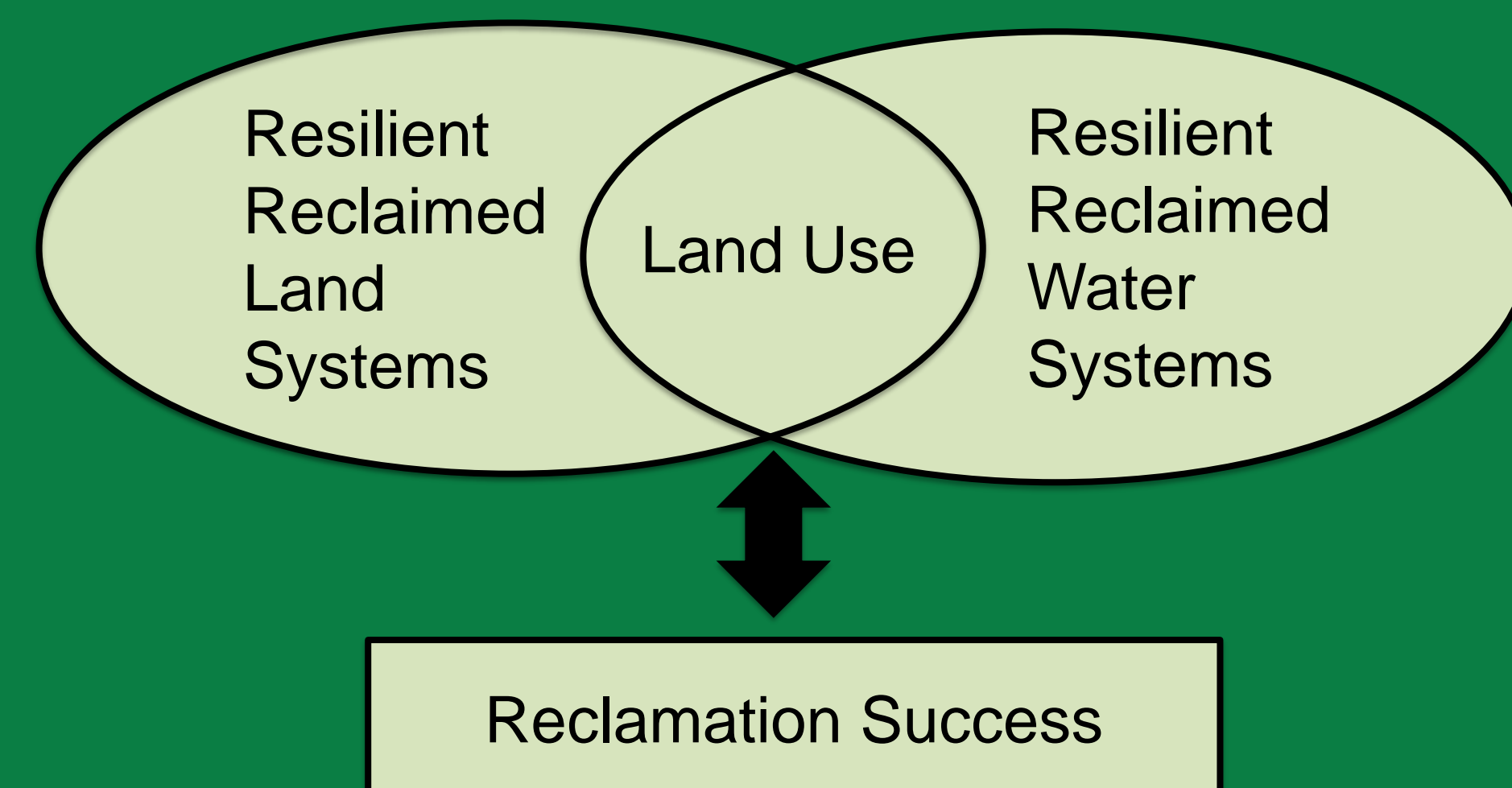


RESILIENT RECLAIMED LAND AND WATER SYSTEMS - SUCCESS INDICATORS

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BACKGROUND

- Reclamation aims to return disturbed land and water systems to former or other productive uses and ensure their long term resilience in a changing environment.
- Quantitative measures of reclamation success are required to achieve diverse end land uses from agriculture, recreation and urban to natural areas.
- Measures of reclamation success have focused on biophysical indicators such as vegetation and soil.
- Most measures are set by regulators, balancing environmental integrity with economic development.
- Resilience, the ability of an ecosystem to recover following disturbance, is not commonly incorporated into indicators of success, although in an increasingly dynamic environment it may be one of the most important indicators to address.



OBJECTIVES

- Assess monitoring and enforcement of water and land regulations for effects in changing practice.
- Determine whether current reclamation success indicators used within the regulatory framework can address resilience and biodiversity aspects for current, legacy and future energy systems.
- Develop and assess modified environmental and economic indicators of reclamation success.
- Determine biota quality after reclamation for traditional land use, including plant materials and wildlife.
- Assess Anthropocene relevant indicators and change.
- Assess various international certification schemes for potential use in energy systems.
- Consult with aboriginal groups on reclamation practices and success indicators.
- Develop a comprehensive and integrated biophysical and community based indicator system.

PROJECT OVERVIEW

Effectiveness of biophysical indicators

- Document and evaluate current reclamation criteria and indicators that are used in local and global jurisdictions.
- Compare current indicators to those not used but which could be critical to determining reclamation success.
- Evaluate performance of current and proposed indicators based on ecological and economic factors to determine which provide the most comprehensive and cost effective determination of reclamation success, as current criteria may not be adequate for creating diverse, sustainable and resilient ecosystems.
- Address research on the soil biological community including soil microorganisms and invertebrates which are directly linked to ecosystem health, biodiversity, function and stability.
- Use landscape level assessment of the variability in soil properties and differences in functional capabilities between reclaimed and natural soils; develop soil quality indicators that best describe functional capabilities of a reclaimed landscape and design a framework for soil quality assessment for land reclamation.

Effectiveness of socio-economic indicators

- Investigate the socio-economic indicators of successful water and land reclamation in energy systems, particularly at the intersection of business, community and the natural environment.
- Investigate the emergence of environmental and common pool resource problems and development of regulatory institutions that support adaptation and build resilience in ecological systems.
- Analyze risk and success factors in major oil exploitation projects, to understand how to incorporate and balance social, economic and ecological consequences.



Vegetation assessment



Assessing soil compaction



Invertebrate pit fall trap

THEME OVERVIEW

As the world moves towards a low carbon energy future, the legacies of past energy technologies remain a serious concern. Reclamation and restoration of land and water after generations of utilization will be important for our future, and many issues must be addressed. Standards for restoration that have been set across decades and based on varying levels of understanding must be assessed, while the technologies and methods for land and water reclamation are investigated and refined. Complete reclamation might take generations, so it is essential to begin broadening and enhancing our knowledge now. We must also begin to foresee potential issues related to new, sustainable energy technologies, so that future generations are not left with the consequences of questions left unasked.

EXPECTED OUTCOMES

- Report on state of knowledge of risk, impacts and management of current and future energy systems.
- Integrated accumulated knowledge into the land and water reclamation regulatory framework.
- Development of a relatively simple, multi-modal indicator for land and water reclamation that incorporates biophysical and socio-economic components, that will be used by local practitioners and work with international vetting schemes.
- Use of achieved knowledge, methods and tools to inform and train land reclamation practitioners.
- Case studies using data from local companies and sites to refine reclamation success indicators.



Reclaimed resilient pipeline in southern Alberta

EXTERNAL PARTNERS

- Alberta Environment and Parks
- Alberta Innovates
- Northern Alberta Institute of Technology
- Brandenburg University of Technology Cottbus-Senftenberg
- GFZ German Research Centre for Geosciences
- Helmholtz Centre for Environmental Research
- Canada's Oil Sands Innovation Alliance (Syncrude Canada Ltd., Canadian Natural Resources Ltd., Suncor Energy Inc., Imperial Oil Ltd., Teck Resources Ltd.)
- Cumulative Environmental Management Association
- Canadian Centre for Corporate Social Responsibility
- Business Sustainability Network, Ivey Business School

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