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Hydropower and the Ecology of Aquatic Systems

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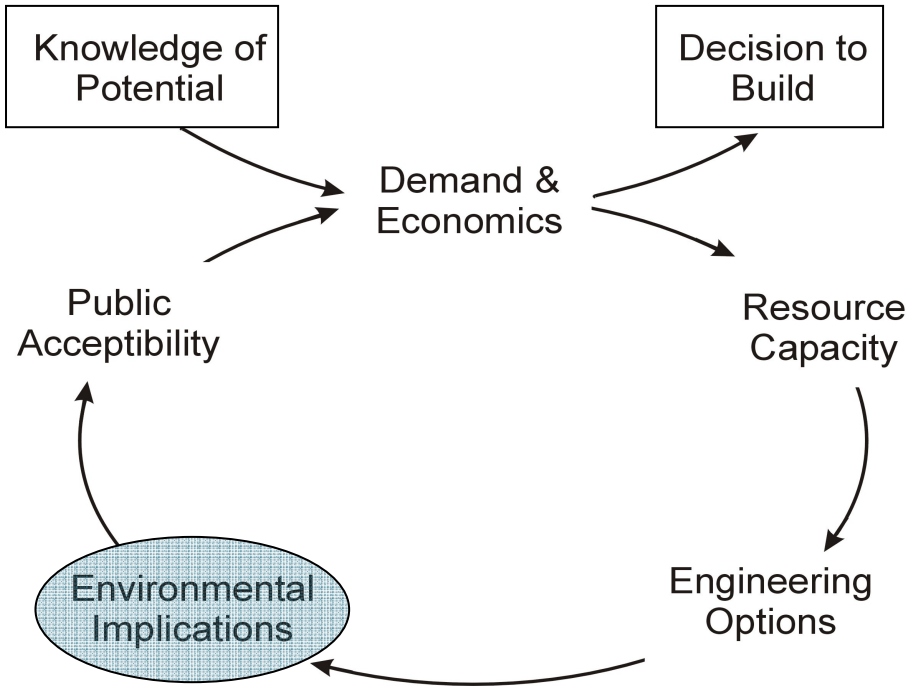
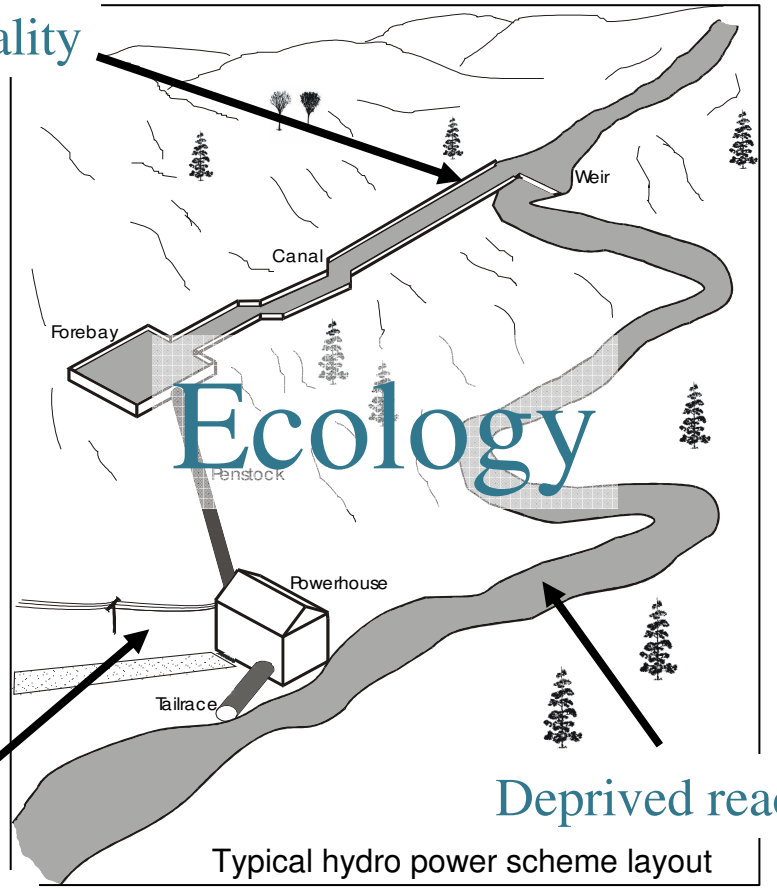
Environmental Implications



Key features of a hydro scheme

- **Weir** – raises water height to the necessary level to fill the leat
- **Leat/Canal** – conveys water to turbine and maintains head level
- **Intake** – water is passes through a screen which prevents the entry of debris
- **Penstock** – a pipe of suitable diameter and pressure rating which conveys water to the turbine
- **Turbine** – converts hydro power into rotating mechanical power
- **Generator**- converts rotating mechanical power into electricity
- **Tailrace** – returns the water to the river
- **Overflow** – allows unhindered passage of excess water in the leat back to the river.
- **Fish-pass** – allows passage of migratory fish

Water quality



Ecology

Deprived reach

Typical hydro power scheme layout

Terrestrial impact

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Assessment

Specific issues

- Fish
- Invertebrates
- Habitat
- Birds
- Mammals

Questions

- Is the site outstanding?
- Is the site of high habitat quality based on the occurrence of one or more rare features?
- Is the site of high habitat quality based on the occurrence of a rare combination of features?
- How does the Habitat Quality Assessment score for the site compare with other sites of the same river type?

Approach

- Stock at risk
  - Biological & physical
  - Stability
- Deprived reach
  - Characteristics
- Impact of turbine
  - Potential screening
- Wider issues
  - Designation
  - Upstream/downstream
  - Neighbouring habitats
  - Over-abstraction
  - Public acceptability
  - Benefits

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Environment Guidelines

Good Practice Guidelines for the Environmental Assessment of Proposed Hydro Power Developments

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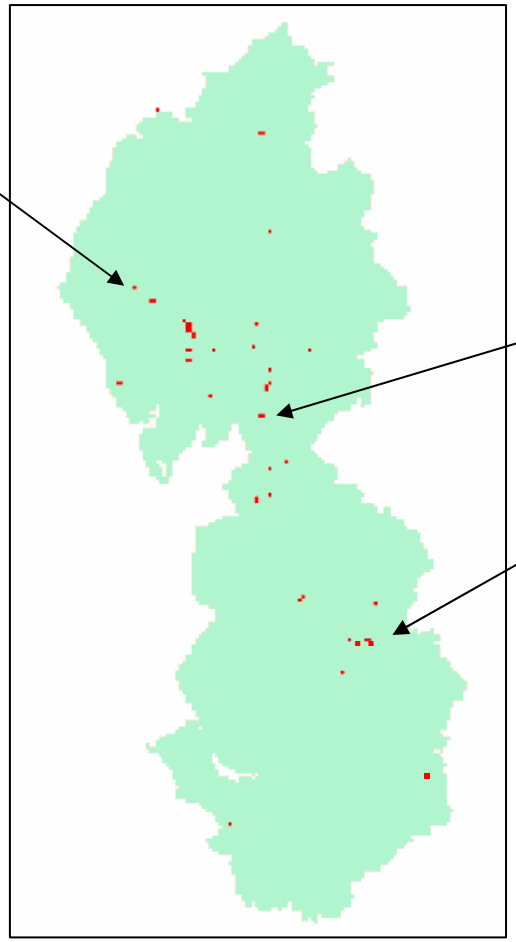
Hydro power sites identified in NWDA region

Black Sail YH, Ennerdale

Three core hydro sites:

North, central & south of NWDA region



Heron Corn Mill

Bury hydro sites

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Environmental– Pros and Cons

Positive	Negative
Emissions-free, with virtually no CO_2, NO_X, SO_X, hydrocarbons, or particulates	Usually involves impoundment of water with loss of habitat due to land inundation
Greater stability of flow	Reduction in flow rates
Creation of aquatic habitat (new pools)	Impacts on river flows and aquatic ecology, including fish migration and oxygen depletion
Environmental monitoring	Changes to siltation
Local aeration	Long lead time in construction of large projects

Summary

- Environment provides capacity and receives impact
- Communication of information is key
- Great opportunity but requires balanced compromise