Towards a balanced program for fish migration and hydropower

Status of hydropower and the political process in The Netherlands

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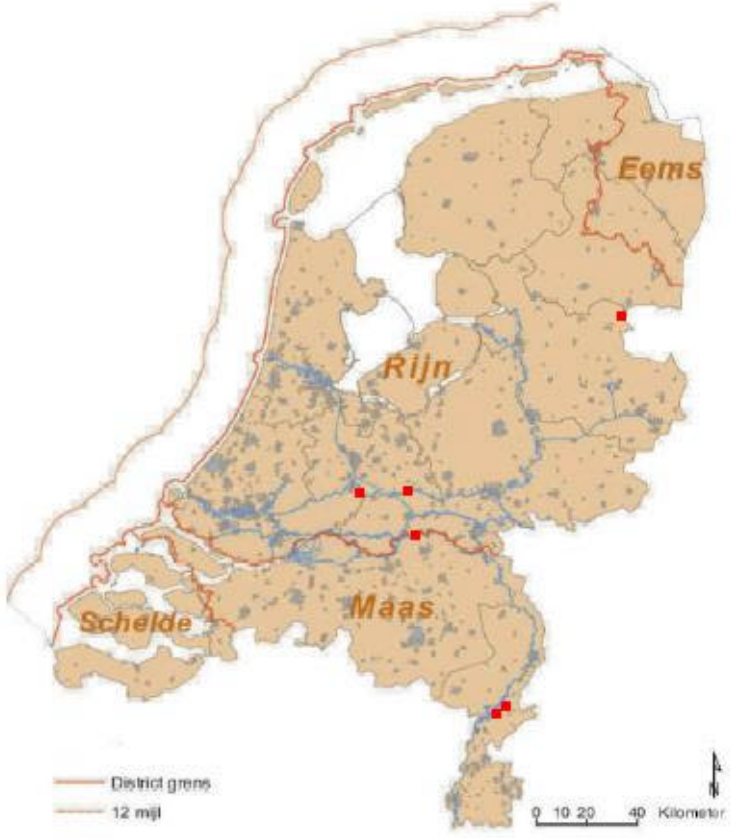
Locations of Hydropower in NL



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Basic data on hydropower in NL

River	Location	Power Installed (MW)	Production (GWh/yr)	Year of (re)-construction
Meuse	Lith/Alphen	14.0	44.0	1990
Meuse	Linne	11.5	35.0	1989
Rhine/Lek	Amerongen	10.0	24.0	1988
Rhine/Lek	Hagestein	1.8	3.0	1958
Vecht	Gramsbergen	0.2	0.3	1988
Rur	Roermond	0.3	0.1	2000

Scale of hydropower in NL

	Hydropower Installed (MW)	Hydropower Production (GWh/yr)
Netherlands (total)	37.8	106.4
Iffezheim (Rhine)	113.0	760.0

Fish mortality due to hydropower in NL

1991 Salmon Restoration Program:

- Stimulation of self sustaining (diadromous) fish stocks in rivers
- Fish guidance at existing hydropower stations
- Research

Field and desk research

- Which species?
- Which potential fish guidance systems?
- Which local relevant factors?
- No progress in measures

Parliament & Government NL 2002-2003

- **Parliament, motion Van der Vlies c.s. 2002:**

  " asks the Government to make fish guidance systems obligatory at old and new hydropower stations on a short term"

- **Government 2003:**

  " fish mortality due to hydropower must be prevented as much as possible"

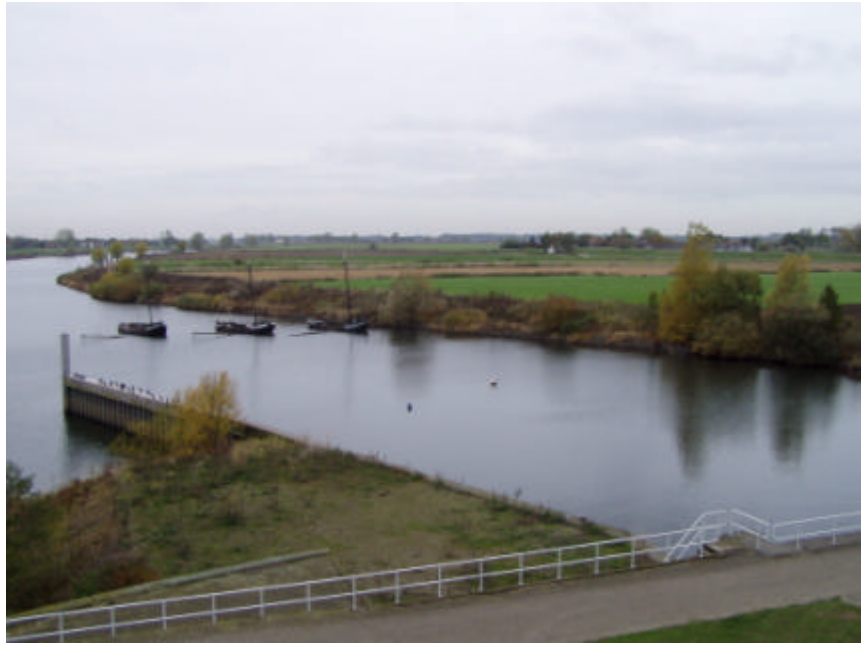
Actions Government

- **Consultation of electricity (hydropower) producers and NGO's with regard to:**
  - Time schedule for measures
  - Type of measures
  - Maximum acceptable level of fish mortality
  - Financial consequences

- **Allowable level of fish mortality:**
  - Match with EU–regulations (Level Playing Field)
  - Consultation of borderstates of Rhine and Meuse

Consultation of E-producers Linne and Lith

- **Why no measures for the fisheries?**
- **Who will pay for the costs?**
- **Which measures ALARA and cost-effective?**



Cost effective fish guidance systems at Linne and Lith

- **Mechanical systems**
  - risk of clogging by floating dirt
  - cost € 0.02-0.05/kWh
- **Behaviour inducing systems (light and noise)**
  - should be used in combination
  - also need protection by screens
  - cost € 0.04-0.05/kWh
- **Migromat (is only usefull for eels)**
  - costs € 0.001-0.002/kWh

Conclusions

- **No reliable and cheap fish guidance systems for all fish species possible now in NL**
- **But management of the hydropower stations (Migromat) is an option for eel for the short term**
- **Possibilities in Dutch laws for Nature Conservation, Flora & Fauna and Water Management**

Recommendations

- **European research needed, aiming at enlarging knowledge base and innovative cheap solutions**
- **Standards for acceptable levels of fish mortality should be made on a watersystem level: a possible role for River Commissions**
- **Design of <u>new</u> hydropower stations and location should be based on minimizing ecological damage (WFD): possible role for EU in providing standards**