# Never Cut What You can Untie: Colonial Irrigation Development as a Metaphor

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# Who am I?



Editor of Water History



Treasurer of the International Water History Association

**Maurits Ertsen** 



International Water History Association

But in my daily life just a professor Water Resources Management at Delft University of Technology, the Netherlands



## What will I try and do today

Discuss change and continuity in water policies and practices

Discuss negotiation and human agency

Show that "change" and "continuity" are difficult to apply to societies/institutions/groups ...

... because within those entities differences can be found

Offer a few approaches that allow for a stronger theoretical underpinning of these notions





Nationaal Archief Ministerie van Onderwijs, Cultuur en Wetenschap

# Colonial and post-colonial change & continuity in irrigation development in the Netherlands East Indies and Indonesia













## A complete regime triangle

#### Guiding principles

Mutual presence of sugar cane and rice Economic optimization per unit of land Separation of irrigation and drainage canals

#### **Promises & Expectations**

Developing a colony for both colonizer and colonized Developing empty areas through settlement schemes

#### **Design requirements**

Discharge measurement / regulation necessary

Canal capacities to be determined Tertiary unit size of 150 to 200 bouws (100 to

140 hectares); to be increased outside Java

Low head losses available

Water demand (cropping pattern)

Regular layout, size and shape of tertiary and secondary units

#### **Design tools**

Tegal capacity curve Water use graph (Pemali, Demak) Melchior, Begemann and Der Weduwen method for peak flows Several calculation methods for canals (Chezy/Bazin, Strickler-Manning, De Vos, nomograms) Golongan system Cultivation plan Van Rosse's labelling system Vlugter stilling basin method

#### Artefacts and operation

Romijn discharge measurement structure Water regulation of 1936 Intake structures, weirs Wadoeks (occasionally) Canal systems



# The development process





# The key of the regime

- Two crops needed irrigation: rice and sugar cane
- Within an irrigated area these two crops were present simultaneously
- Water distribution to these crops was separated in time, but was realized with the same infrastructure
- Each year the positions of the crops could differ
- Each crop was to be irrigated according to the actual crop water requirement





What was seen as needed: measurement and regulation of water flows



# What kind of management? Experiment!













# What kind of management?









- Régions arrosées par la même rivière.
- <u>75</u> Bassin d'une rivière en amont de la prise d'eau. Surface en K.M?
- Canal principal.
- 18 Bassin d'un affluent. Surface en K.M?
- ---- Chemins de fer.

- Les parties couvertes de hachares représentent les terrains irriqués par les rivières suivantes:
- Le Losarie prise d'eau à Tjibéndoeng.
- Le Kaboefoetan. id id & Nambo.
- Le Babakan id.— id.— a Tjisadap.
- Le Pemalie id.— id-à Notok.



| - |                            | Pategoean  | Pekalen   | Pemali   |
|---|----------------------------|--|---|--|
|   | Crop                       | Rice and sugar cane  | Rice and sugar cane   | Rice and sugar cane  |
|   | Cropping<br>calendar       | Not explicitly made  | Drawn before the West<br>Monsoon irrigation season<br>in exchange between Civil<br>Service (Javanese and<br>Dutch) and Public Works                           | Drawn before the West Monsoon<br>irrigation season in exchange<br>between Civil Service (Javanese<br>and Dutch) and Public Works; 3<br>cropping phases |
|   | Golongan                   | Golongan-ajer:<br>proportional distribution<br>between fixed areas<br>consisting of sawahs<br>from several desas | Originally groups of<br>tertiary units (based on<br>secondary or<br>topographical borders);<br>later each desa divided in<br>six golongans                    | Each tertiary unit has a position<br>in one golongan; one secondary<br>unit includes several golongans   |
|   | Golongan<br>phases         | None   | 6, first one starts irrigation<br>at November 16 <sup>th</sup> ; new<br>golongan starts every two<br>weeks; final golongan<br>starts February 1 <sup>st</sup> | 5, first one starts at October 16 <sup>th</sup> ;<br>14 days phases  |
| - | Oeloe oeloe                | Cooperation required of<br>several oeloe oeloe<br>desas  | Not clear   | Originally oeloe oeloe desa; later<br>oeloe oeloe golongan or<br>pembagian   |
|   | Engineering<br>involvement | Distribution up to the golongan-ajer   | Water distribution within tertiary unit   | Water distribution up to tertiary<br>unit  |

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# 'A typically Indian history of suffering'

(Trenité 1923; 8)

1916 Commission: general water regulation for Java

September 8, 1925: Commission presents draft regulation

Not taking into account the new provinces on Java in January 1930

Economic crisis after 1929: rice replaced sugar cane Increased pressure on water

Water boards? Balinese subak? Obligatory planting regulations?

'[...] the method so soundly tested from the division mentioned [Pemali] [may] find broader and more systematic application' (Polderman 1936; 9)

**'General Water Regulation for Governmental Lands of Java and Madoera**' published in 'Indisch Staatsblad' of 1936



European colonial policies of exploitation and development have always been closely associated with irrigation. In this book, Maurits Ertsen explores how the Dutch realized their irrigation efforts in their most important colony the Netherlands East Indies, modern Indonesia. Colonial agrarian policies, irrigation goals and technical goals appear to be closely linked in a so-called technological regime. Within the structuring context of this regime, irrigation engineers created what they perceived as locales of happiness for Javanese farmers and sugar industry. Although the agro-political realities in Indonesia and the world have dramatically changed after the Second World War, Dutch irrigation engineering continued to be based upon the design approach developed in the Netherlands East Indies.

#### About the author

Maurits Ertsen is lecturing irrigation at the water resources management group of Delft University of Technology. His teaching and research center on the close interaction between human action and system behavior in irrigation. His work spans modern, historical and archeological times and covers many regions worldwide. What binds all these realities together is irrigation itself, this fascinating confusion emerging from social and material structuration processes.

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### **Locales of happiness**

Colonial irrigation in the Netherlands East Indies and its remains, 1830 - 1980





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Colo East

1980

Maurits

VS SD



# The development process



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Policy: early closure (before 1910), with one exception

Details (design approach): mixed closure, but most late in the colonial period (1920 – 1940)



# **Netherlands East Indies**: continuity in "policy", change in "details"

#### Continuity



### Early period

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# **Independent Indonesia**: continuity in "details", change in "policy"

#### Change



## Colonial period

**Continuity** Indonesia

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## Three main points

Social or organizational learning is a pretty strange term ...

- ... when taking into account that only people learn
- ... when taking into account that goals differ
- ... when taking into account politics

Any government is polycentric ...

 ... when we allow for (always occurring) power and interpretation struggles within a bureaucracy

Societal processes are not linear ...

- ... as different 'speeds' of change/continuity are found for and within different groups on different subjects
- ... as politics does not drive technology nor the other way around







# Colonial and Post-colonial irrigation development on the Gezira Plain







# A kind of timeline

- **1905** Sudan Plantations Syndicate
- **1906–1925** several smaller cotton systems
- **1911** tests in Gezira area
- **1917** agreement between SPS and Sudan colonial government
- **1925** start Gezira with 300,000 acres, opening Sennar Dam
- **1926–1940** several extensions of the area
- **1950** Sudan Government takes over Gezira, start Gezira Board
- **1956** Sudan independence



## **1990: World Bank project**

How to improve Gezira.

Night storage: a system to avoid the necessity to irrigate during the night

"The night storage reservoir concept was introduced in the design of the first 300,000 [acres] in the mid 1920's when it was realized that tenants were opposed to irrigation at night "















## Night storage - 1924

*Engineers* : design for continuous flow in main system and field system, "*A Hobson's choice*"

*Managers* : irrigation during day only, had said so "*again and again*"

Reason mentioned: "*Farmers are not adapted to night irrigation*"

Actual reasons:

- Supervision easier during daytime
- British staff want to sleep too
- Rhythm of earlier (smaller) schemes was similar





## Night storage – 1930s

In the late 1920s and the 1930s, the system was extended in three waves

#### **Each time**

Engineers: continuous flow! Night storage "*the wrong principle* "

Managers: night storage, same reason: "*farmers are not adapted to night irrigation*"

**Outcome: night storage** 





## Night storage – 1970s

Probably kept pretty well until the late 1950s

But 1960s and 1970s: night irrigation by farmers! Day and night rhythms in the canals and fields changed

But not on paper: all the official documents in the 1970s still mention the system as the basis for Gezira irrigation

Nowadays: no night storage anymore, in practice or on paper







# The metaphor: Negotiation and improvisation in environmental policy developments and societal practices



### So, where do we stand now?

Change and continuity is different for specific areas and groups in society

Negotiations and human agency are important to include in the analysis

"Negotiations", "human agency", "change" and "continuity" play out within environmental contexts

Nature has a role to play













#### Number of tubewells in the Indus system









THE WALL STREET JOURNAL.

# How to explain this?

- There seems to be a relation between climate (temperature rise) and water control (number of pumps)
- Response to changing climate????????



"Do you think all these film crews brought on global warming or did global warming bring on all these film crews?"







- Drainage pumps in the 1960s
- Converted into irrigation pumps



So, the rising number of tubewells in the Indus basin was an unforeseen side-effect of another policy

With undesirable consequences in terms of water use and quality



# Some theoretical support for negotiation and improvisation in environmental policy developments and societal practices



Negotiations Power relations

Development is conflict

One may want to keep it within limits ...

... but there will be conflict anyway.



Participatory Projects and Local Conflict Dynamics in Indonesia

PATRICK BARRON RACHAEL DIPROSE MICHAEL WOOLCOCK





#### The German philosopher/sociologist Habermas

Action theory and theory/model on societal development





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#### Giddens



Foucault

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# BRUNO LATOUR

# Reassembling the Social











BRUNO LATOUR Reassembling the Social An Introduction to Actor-Network-Theory



**ANT - Actor Network Theory** 



"An actor-network is traced whenever, in the course of a study, the decision is made to replace actors of whatever size by local and connected sites instead of ranking them into micro and macro. The two parts are essential, hence the hyphen. The first part (the actor) reveals the narrow space in which all of the grandiose ingredients of the world begin to be hatched; the second part (the network) may explain through which vehicles, which traces, which trails, which types of information, the world is brought *inside* those places and then, after having been transformed there, are being pumped back *out* of it narrow walls. This is why the hyphenated 'network' is not there as a surreptitious presence of the Context, but remains what connects the actors together."

(Latour, 2005, p179-180)



# Do not distinguish at the start between structure and actor

micro and macro. The two parts are essential, hence the

# **Start with the actor**

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# Find out how the actor links with other human actors and nonhuman entities

# As such, build the network

(Latour, 2005, p179-180)



## Some final words

- 1. Change and continuity is different for specific areas and groups in society
- 2. Negotiations and human agency are important to include in the analysis
- 3. "Negotiations", "human agency", "change" and "continuity" play out within environmental contexts
- 4. Nature has a role to play
- 5. There is no "inside" or "outside", or "local" or "context"
- 6. Networks are created through human agency engaging with other human agents and material realities
- 7. Any pre-suggested division in terms of levels, contexts or relations needs to be avoided.
- 8. The resulting networks link short and long term human responses to and within environmental contexts



