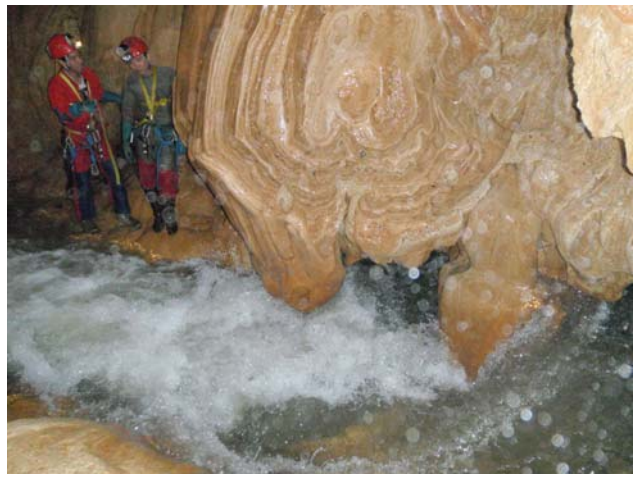
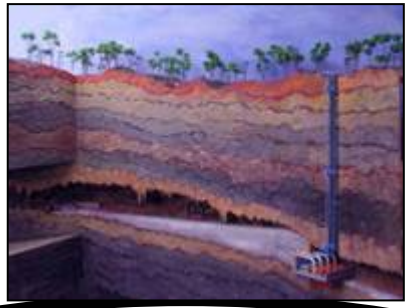
Start-Up Investigation on the Hydro Power Potential in Dong Van Karst Area, Ha Giang Province, Vietnam

28 Sep. – 05. Okt.2010

Franz Nestmann, Institut für Wasser und Gewässerentwicklung



IWRM basic conception



Water resources management/
Regenerative energies

Exploration of water resources

Water distribution /
Intermediate storage

2+2 Concept/
Capacity Building

Break into new markets/
Appropriate Technologies

Sustainability /
Participation

Improvement of living conditions

Estimation of techno-logical development effects

Socio-economic framework

Ecological and microeconomic validation

Protection of water resources /
Sustainable Use

Sewage-/ waste treatment

Drinking water quality backup

Possible project regions in Vietnam

Ha Giang Region in Nordvietnam

Übertragbarkeit / Multiplikation

Anbahnungsreise Vietnam Aug. 2009

Übertragbarkeit / Multiplikation

Anbahnungsreisen Vietnam Aug. 2009

und Sept../Okt. 2010

Hydro Power Plant Ma Le Creek

- Machinery Design for 500 kW
- Maximum Output Rain Season 360 kW
- During Dry Season severe reduction of efficiency (40 kW) & complete shut-off (1 month period)

Pump as turbine (PAT) technology

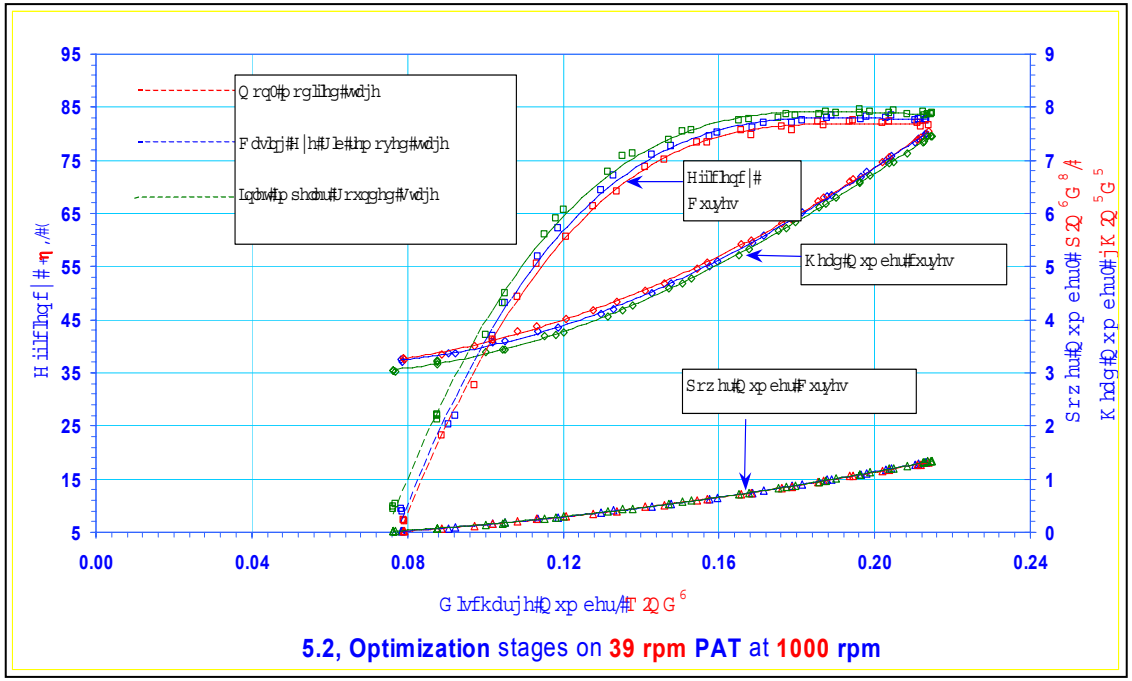

Test Rig at KSB AG


Test Rig at TRL (IWG/KIT)

- low investment costs
- easy to maintain
- easy to operate

„appropriate technology“

Results of optimisation



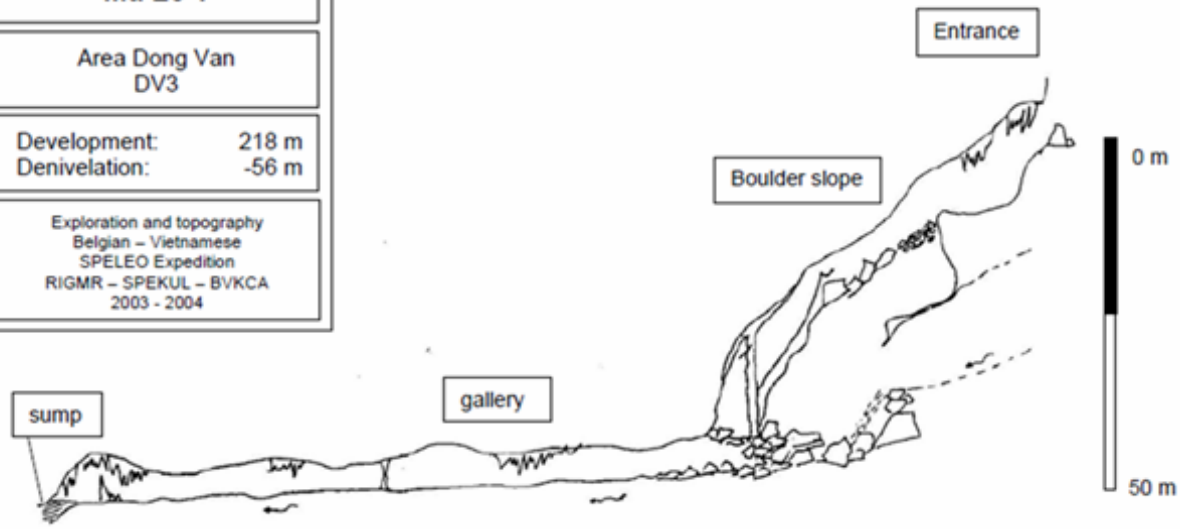
MaLe 1 & MaLe 2

Ma Le 1

Area Dong Van
DV3

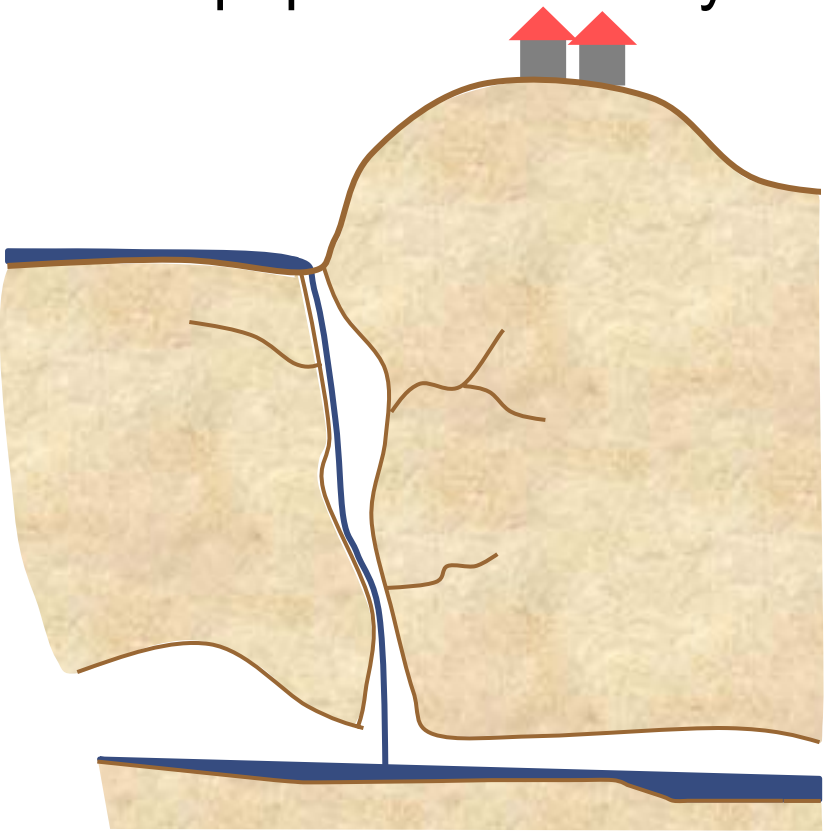
Development:	218 m
Denivelation:	-56 m

Exploration and topography
Belgian – Vietnamese
SPELEO Expedition
RIGMR – SPEKUL – BVKCA
2003 - 2004



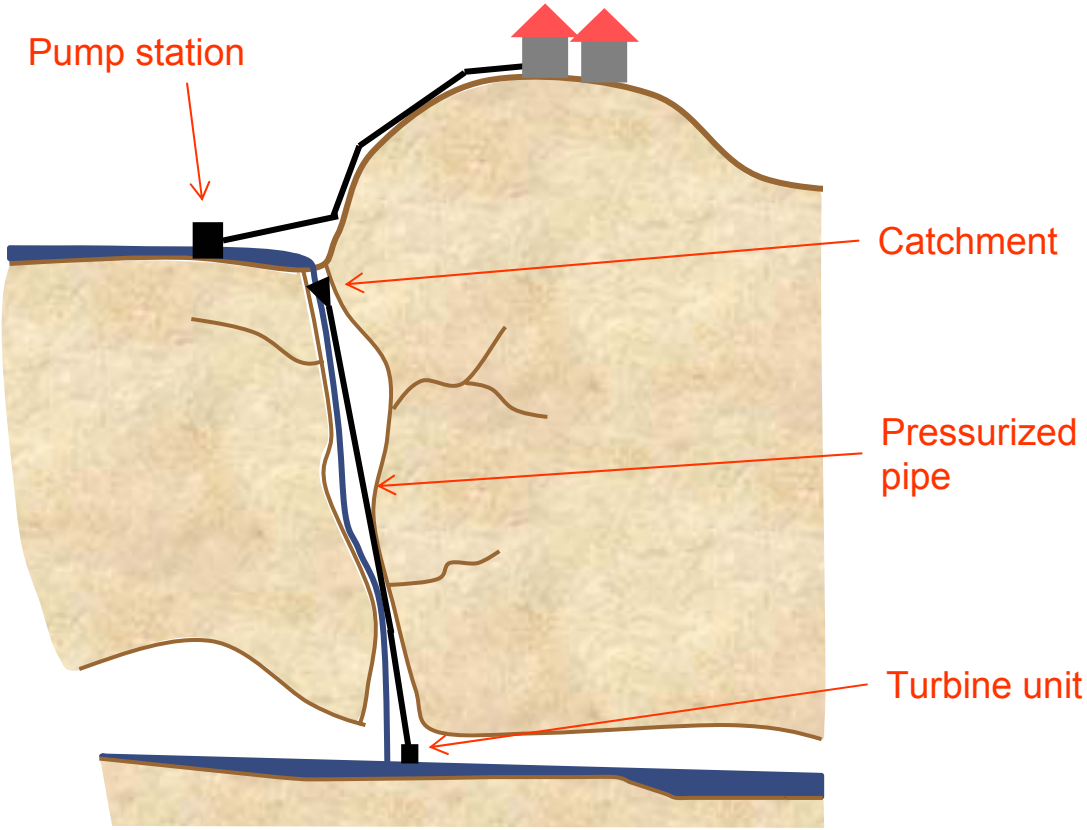
Concept for adapted decentral water supply technologies

- High elevation differences
- Little discharge
- Low population density



Concept design calculation

- Small decentral hydro power units (e.g. pumps as turbines)
- Water pumping using electricity from hydro power unit



Example calculation:

Given:

Cave depth	H = 100 m
River discharge	Q = 10 l/s

Hydro power & pumping units:

Pump hight:	H = ~ 500 m
Pump discharge:	Q = ~ 50.000 l/d

Water distribution:

Water supply:	1.000 cap
with	50 l/cap/d

Project planning / schedule

2009	First site visits
08/2010	Proposal submission to BMBF for feasibility study
09 & 10/2010	First Expedition
01/2011 – 06/2011	Feasibility study
08/2011	Proposal submission to BMBF for joint project
End of 2011	Karst water symposium
2012 – 2014	Joint project

Concept for Vietnamese-German cooperation

- Proposed work packages & possible partners

Vietnamese-German Cooperation
for the Development of Sustainable
Karst Water Technologies

Coordination

VIGMR, WRU IWG/KIT, VGU

Exploration, surveying & monitoring	Water pumping & hydro power Energy efficiency	Water treatment & distribution Energy efficiency	Resources protection & capacity devel.
• VIGMR ,IWG • Speleo Club (B) • IMG, IPF, AGW/KIT (D) • TU Munich (D) • Industry, e.g. VITO, (B)	• IWG/KIT (D) • Industry, e.g. KSB AG (D), Voith Hydro (D), Siemens AG (D), Andritz AG (D)	• IWG/KIT (D) • Industry, e.g. VAG GmbH (D), Siemens AG (D), VITO (B)	• WRU (VN) • Univ. Bochum (D) • IWG/KIT (D)

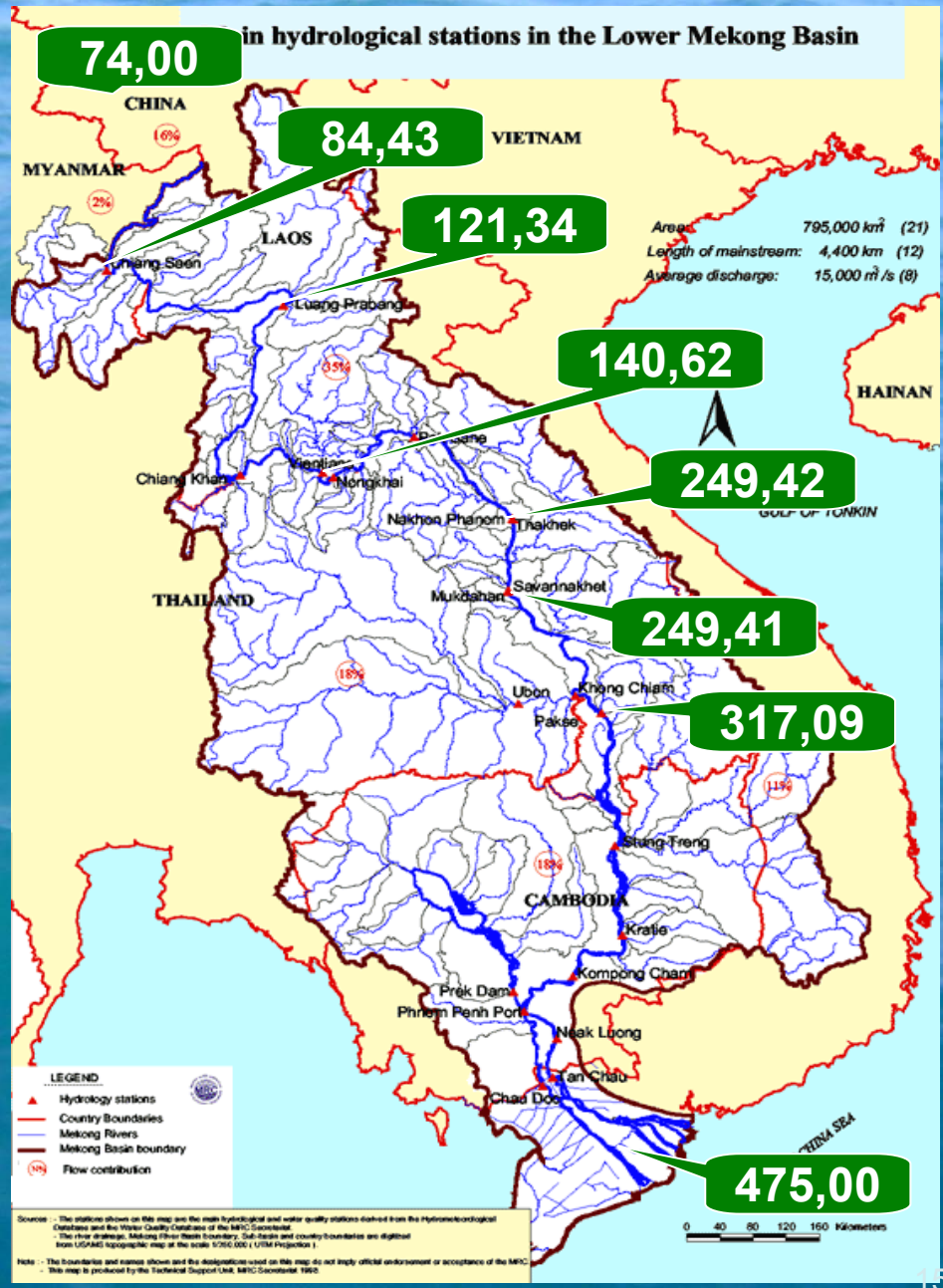
Vietnamese-German Cooperation

Ha Giang Karst Region and Thu Bo Barrier Ho Chi Minh Flood Protection

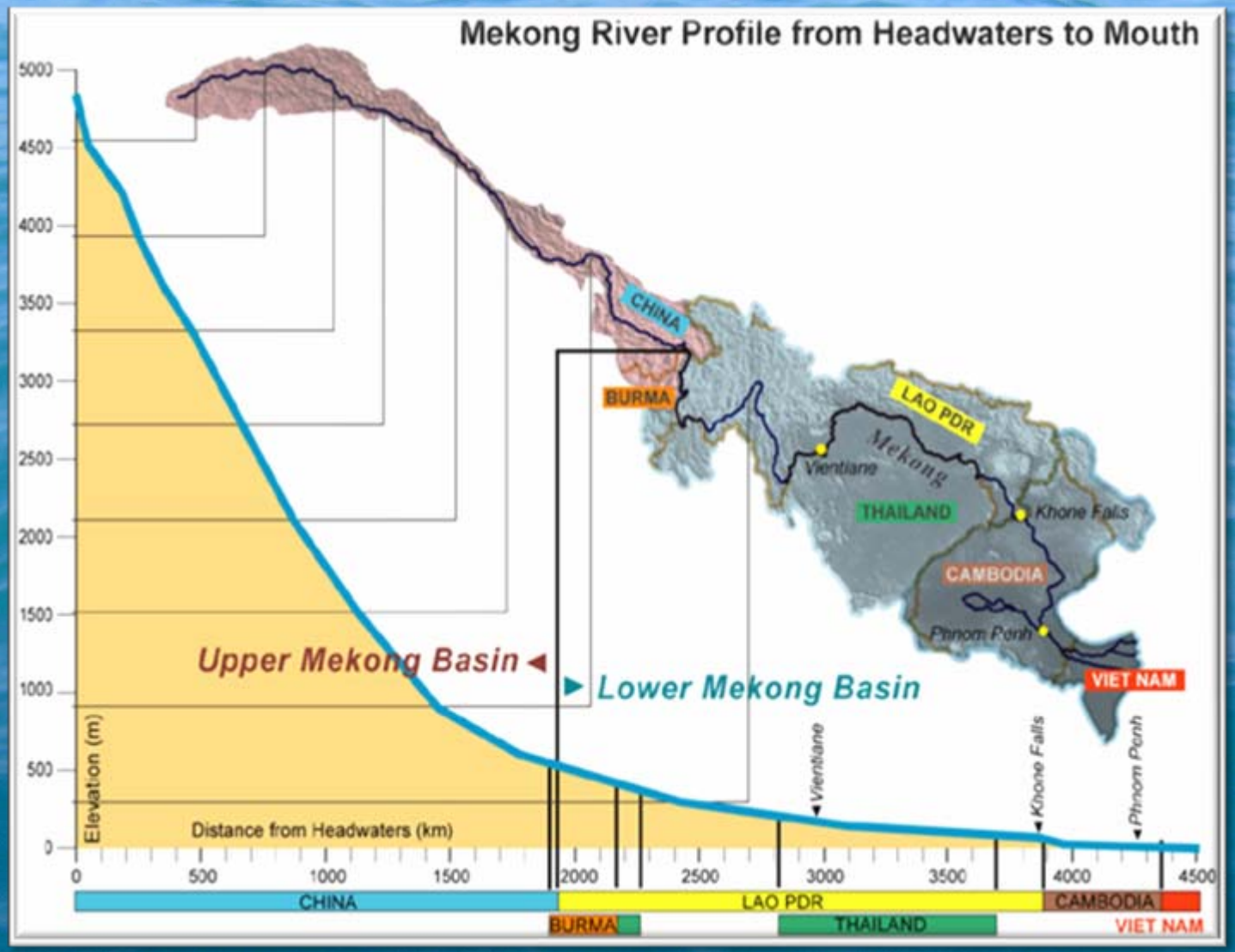
Prof. Dr.-Ing. Franz Nestmann, MSc. Le Xuan Bao, Prof. Dr.-Ing. Minh Thu November 2010

Dòng chảy thượng lưu:

Vị trí	Diện tích lưu vực (km^2)	Tổng lượng dòng chảy năm (tỷ m^3/năm)
Cảnh Hồng (TQ)		74,00
Chiang Sean	189.000	84,43
Luang Prabang	268.000	121,34
Nong Khai	302.000	140,62
Nakhon Phanom	373.000	249,42
Mukdahan	391.000	249,41
Pakse	545.000	317,09
Cửa sông	745.000	475,00

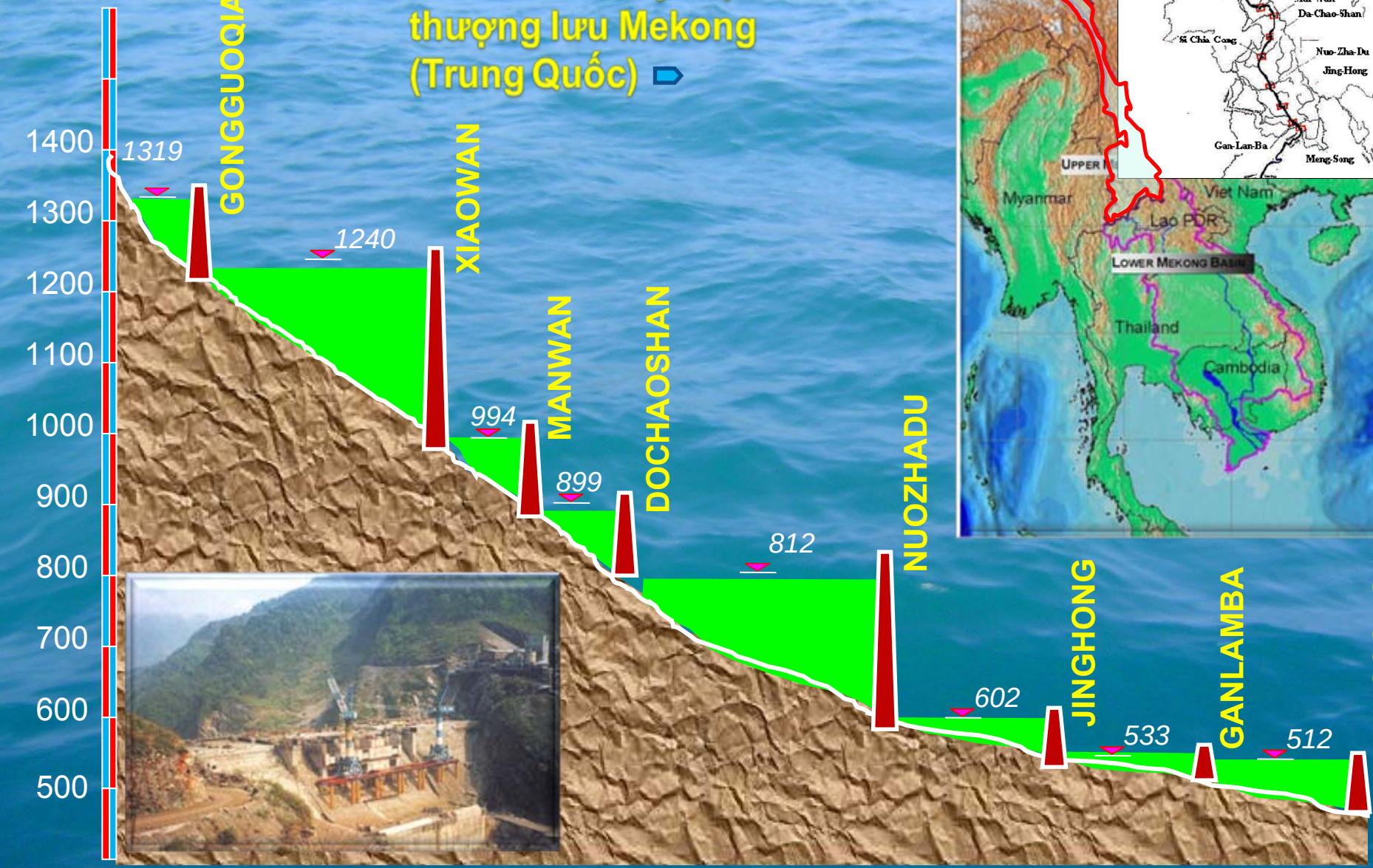


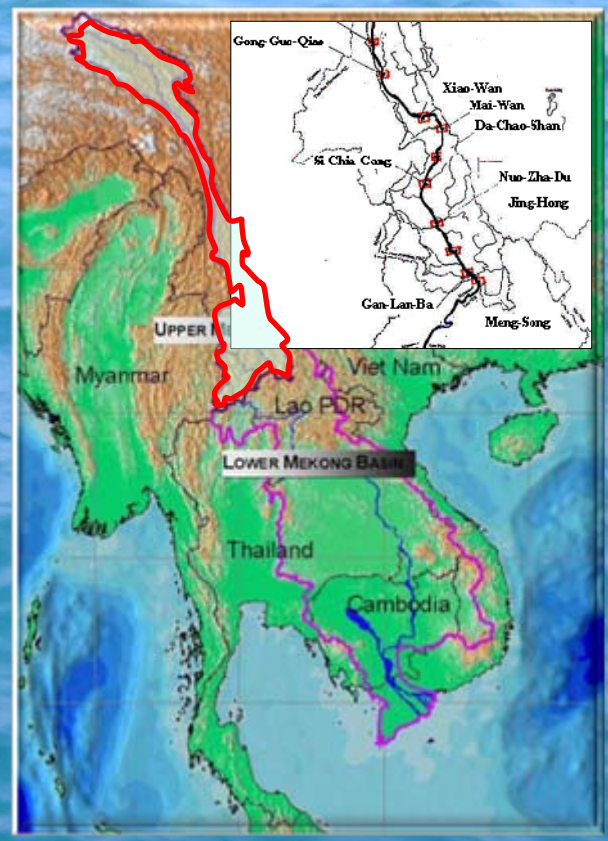
- **Các phát triển thượng lưu:**



Quy hoaïch toång theå thuûy lôïi ÑBSCL trong ñieàu kieän bieán ñoåi khí haäu - nöôùc bieån daâng

Phát triển Thủy điện thượng lưu Mekong (Trung Quốc)





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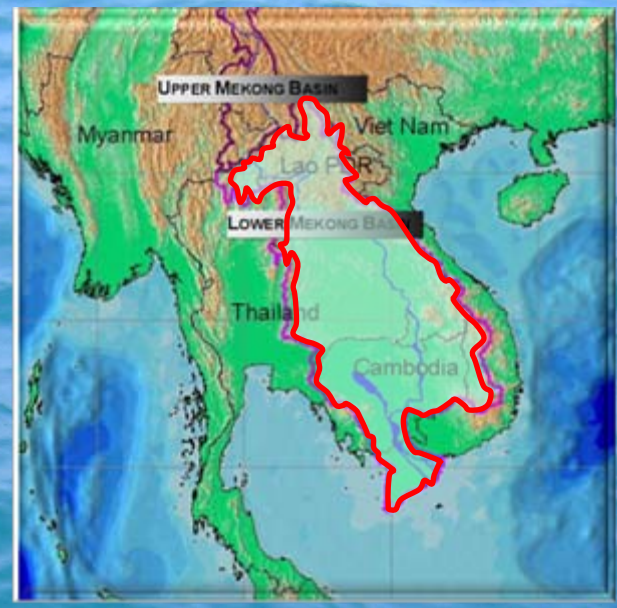
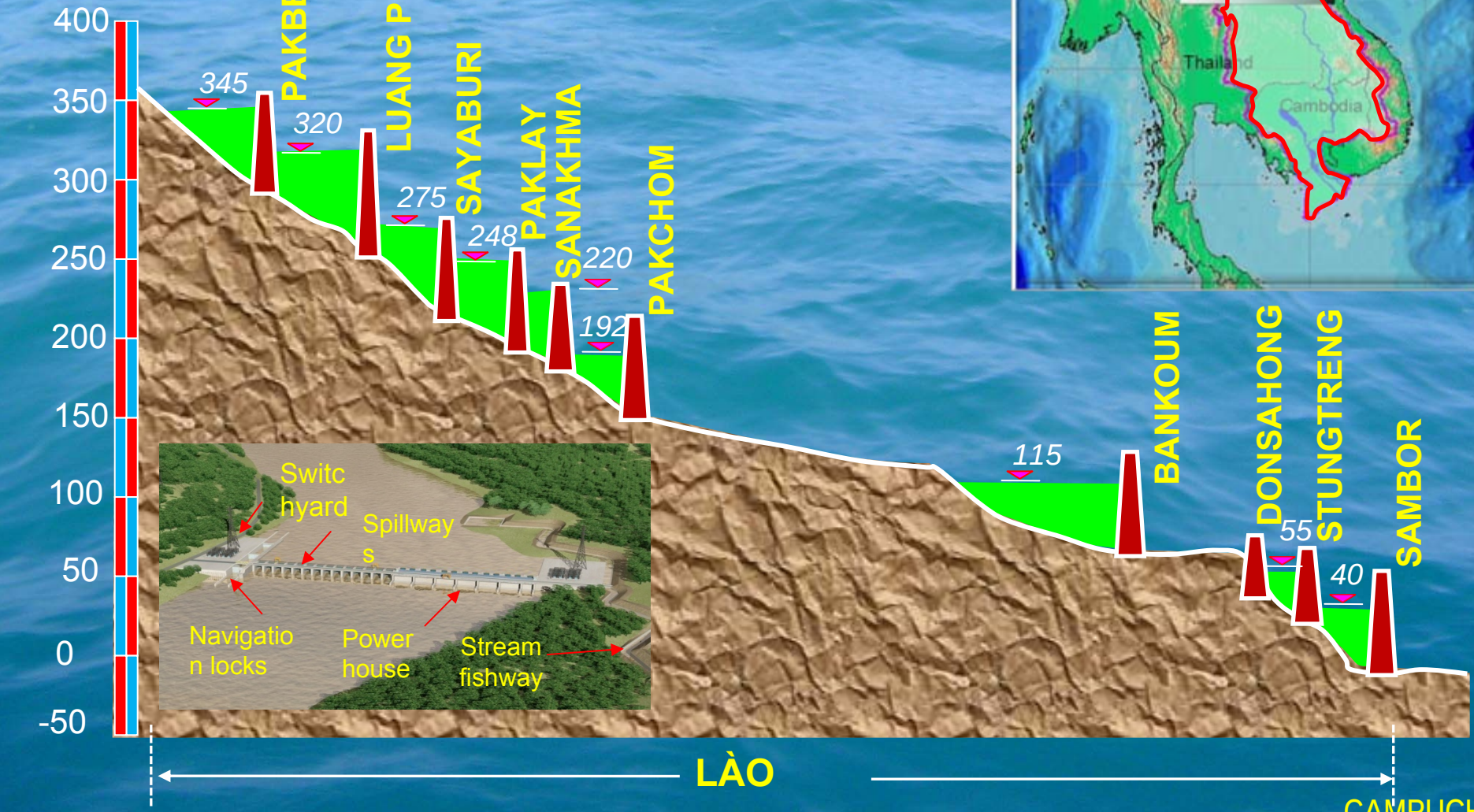
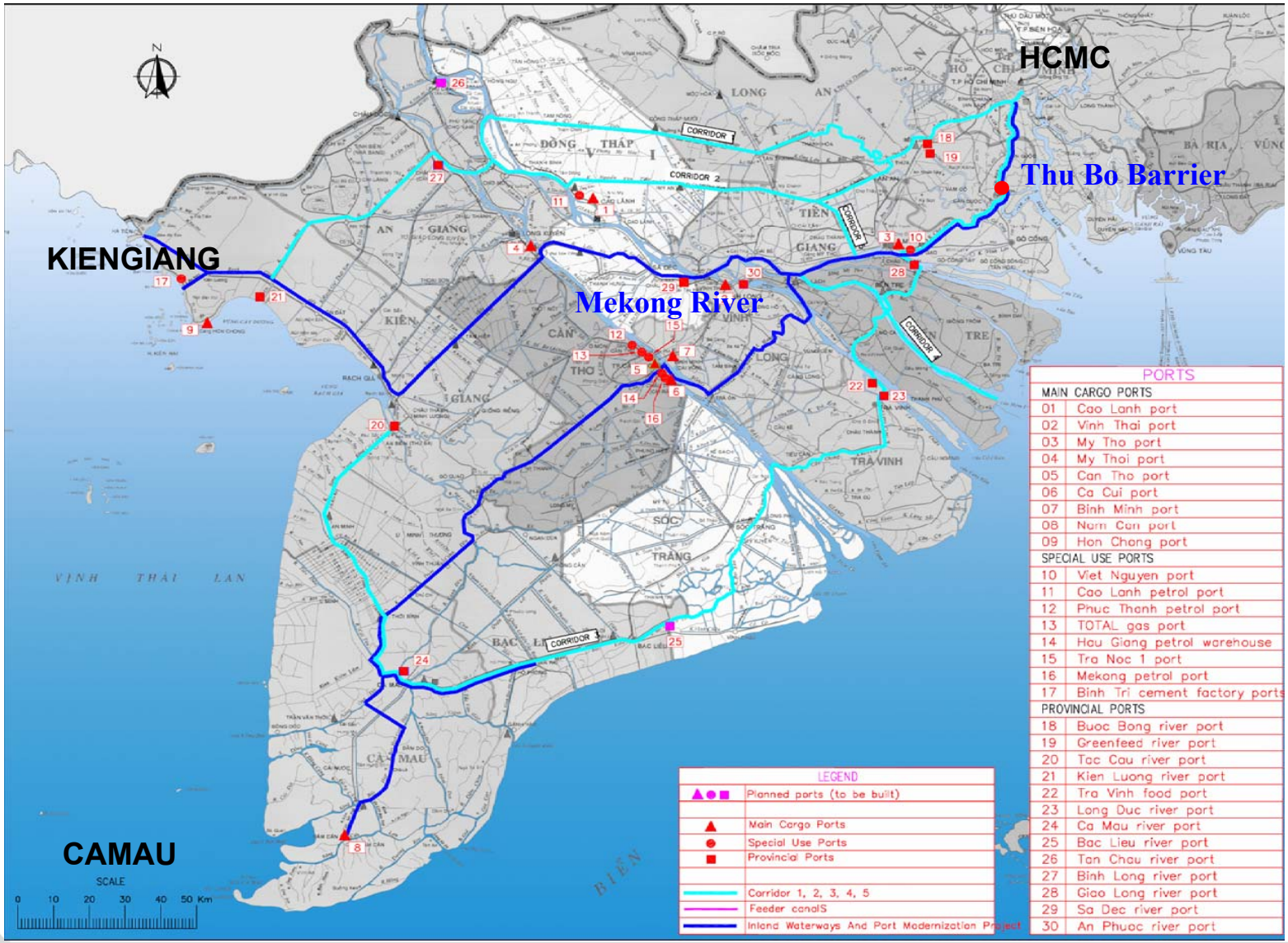
Phát triển Thủy điện hạ lưu Mekong



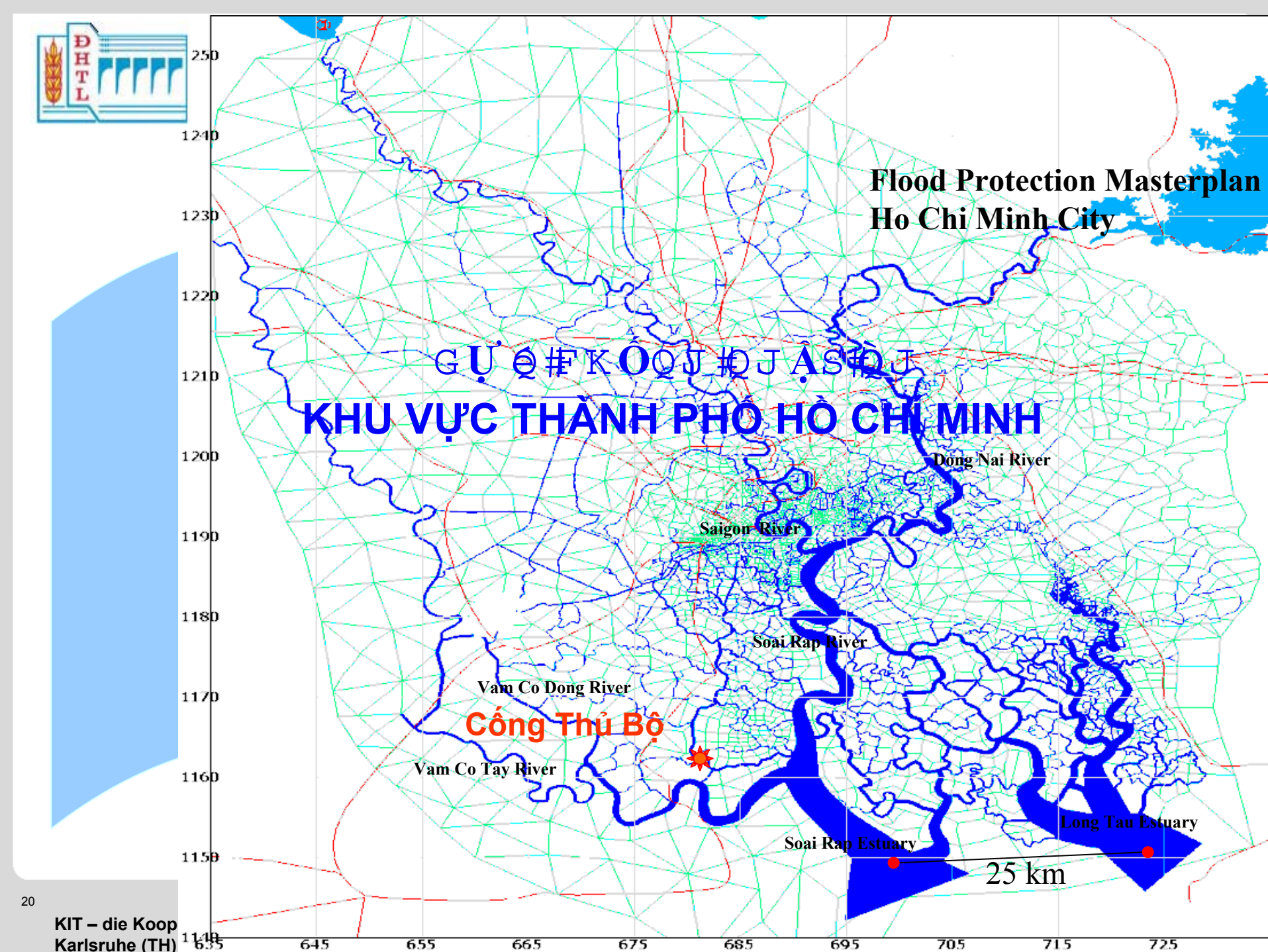


YÊU CẦU GIAO THÔNG THỦY
Navigation Routes



Routes:

Tuyến TPHCM - Kiên lương và đi Càmau thuộc cấp III và **đi qua tuyến dự kiến xây dựng cống Thủ bộ.**


Flood Protection Masterplan
Ho Chi Minh City
KHU VỰC THÀNH PHỐ HỒ CHÍ MINH
Dong Nai River
Saigon River
Soai Rap River
Vam Co Dong River
Cống Thủ Bộ
Vam Co Tay River
Long Tau Estuary
Soai Rap Estuary
25 km
250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
1140
635
645
655
665
675
685
695
705
715
725

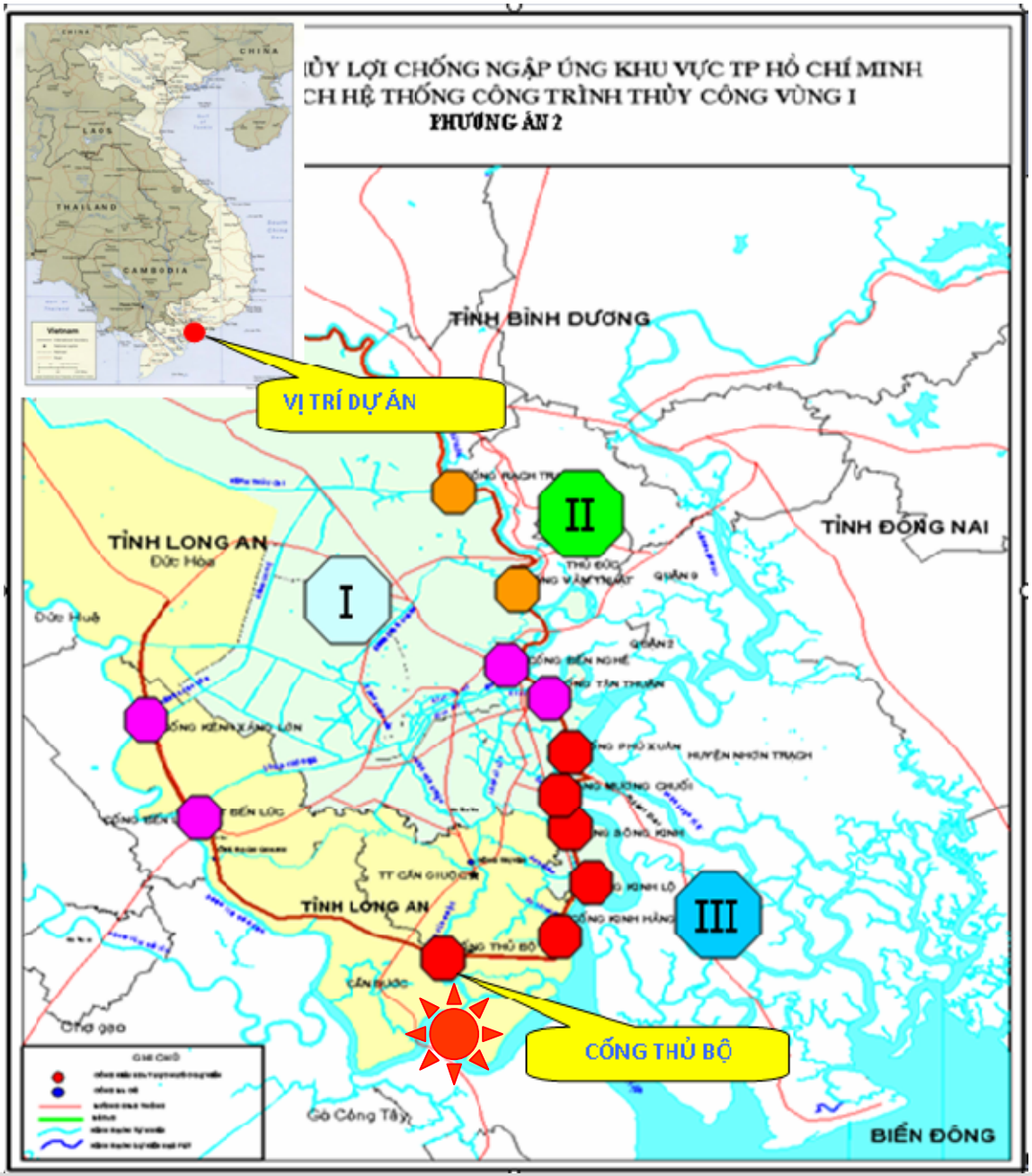
VỊ TRÍ

CĂN CỨ

MỤC TIÊU

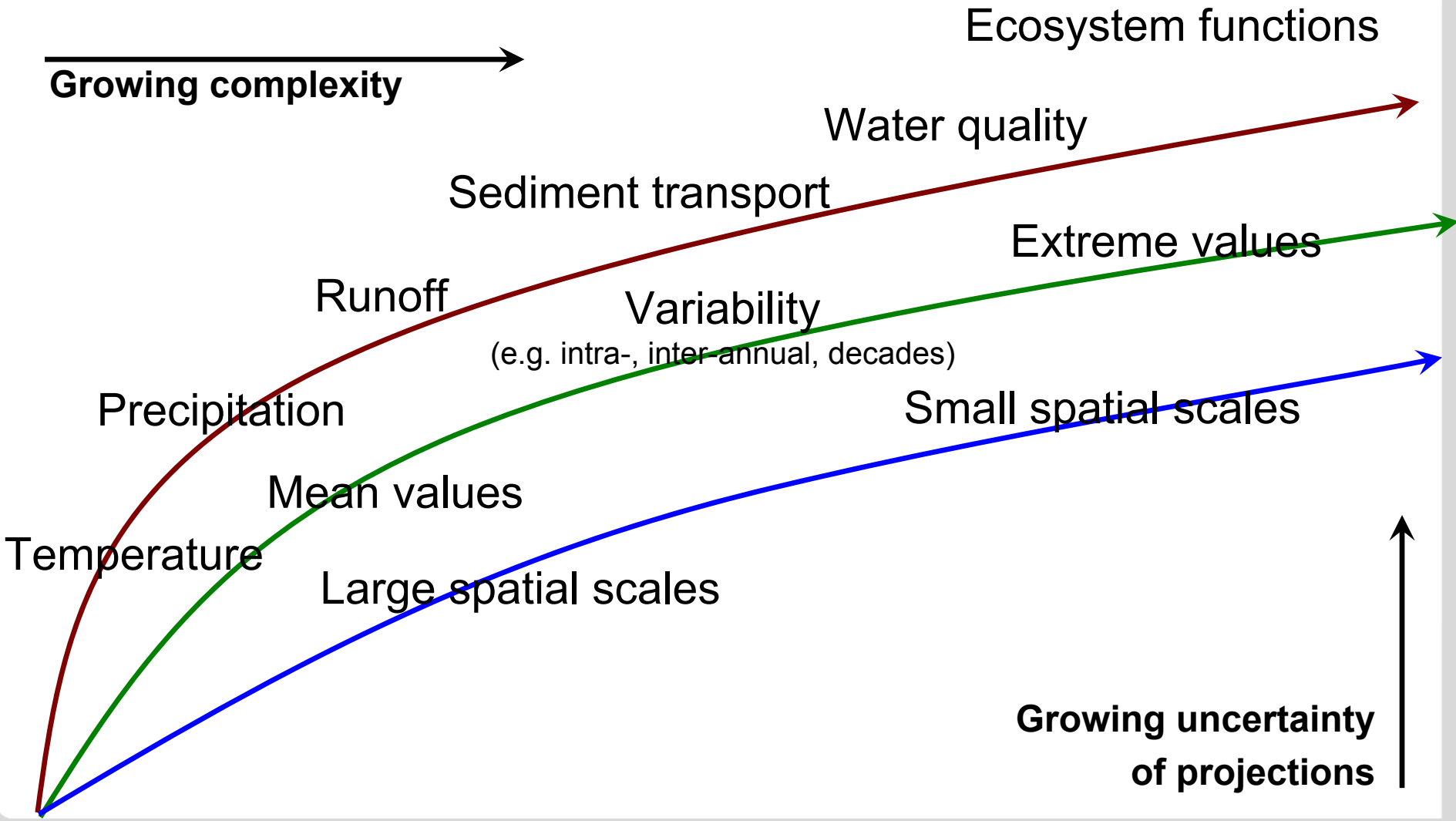
NHIỆM VỤ

Masterplan of Flood-Protection of Ho Chi Minh City



Reliability of projections into the future due to climate change

Example: Sea-water-level-rise and landlosses



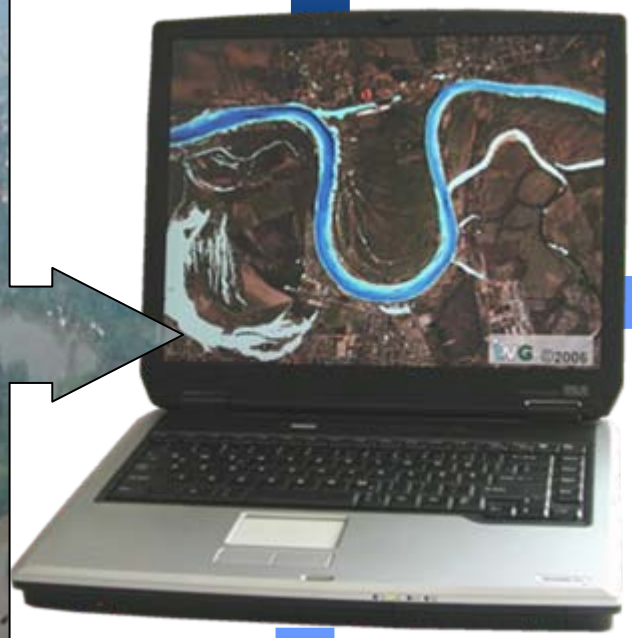
Networking for an integrated flood management

Meteorology
Heavy precipitation
Rainfall-Simulation

Hydrology
Early warning / forecast
Retention measures

Hydraulics
Flood modeling
Real-time forecast

Geotechnics
Dike safety
Failure scenarios



Results

- Online-compatible model components
- Appraisal of flood scenarios

Users

- Water management and
- Technical authorities
- Emergency management

Operational use as / for

- Planning instrument
- Training tool
- Desicion guidance

"Quy hoạch thủy lợi chống ngập úng khu vực Tp. Hồ Chí Minh". Được phê duyệt theo quyết định số 1547/QĐ – TT ngày 20/10/2008 của Thủ tướng Chính phủ.

+ VỊ TRÍ : **sông Cần Giuộc, đoạn hạ lưu cầu Thủ Bộ**

H.Cần Giuộc, H.Cần Đước Tỉnh Long an

MỤC TIÊU

Chống ngập úng cho khu vực TP.HCM và Long An (ĐH, BL, CĐ, CG)

DT được bảo vệ: 2.486km2 (Total Protection Area)

TP.HCM 1.879km2, Long An 607km2

(Ho Chi Minh City, Long An Province)

NHIỆM VỤ:

Cùng với hạng mục khác

Kiểm soát triều

Điều tiết đón mưa (Zmax=<+1m) tăng cường năng lực tiêu

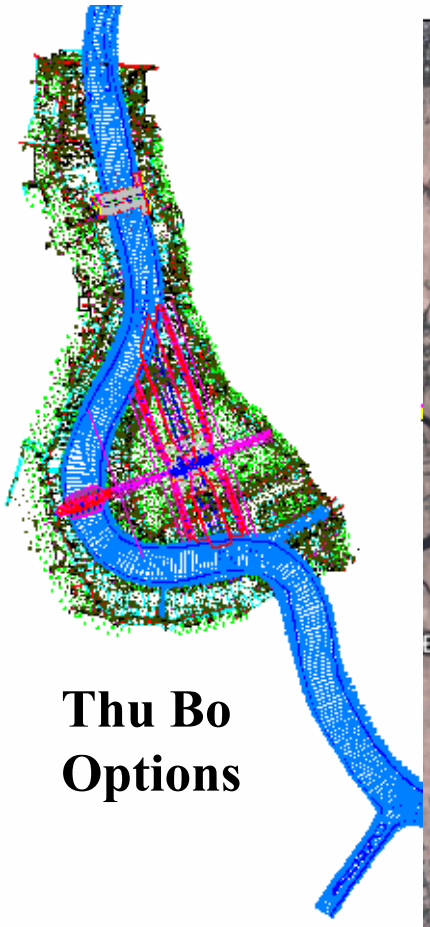
Góp phần cải thiện môi trường nước trong DA

Đảm bảo giao thông thủy

Can Giuoc River

1. ĐIỀU KIỆN ĐỊA HÌNH - ĐỊA MẠO

GÓI THẦU: TV1-TƯ VẤN KHẢO SÁT, LẬP DỰ ÁN ĐẦU TƯ XÂY DỰNG CÔNG TRÌNH CỐNG THỦ BỘ.
THUỘC: DỰ ÁN CHỐNG NGẬP ÚNG KHU VỰC THÀNH PHỐ HỒ CHÍ MINH.
ĐỊA ĐIỂM: TỈNH LONG AN – VIỆT NAM.



Thu Bo Options

TUYẾN CỐNG PHƯƠNG ÁN 1

Variant No I

TUYẾN KÊNH DẪN THƯỢNG LƯU

Variant No II

TUYẾN CỐNG PHƯƠNG ÁN 2

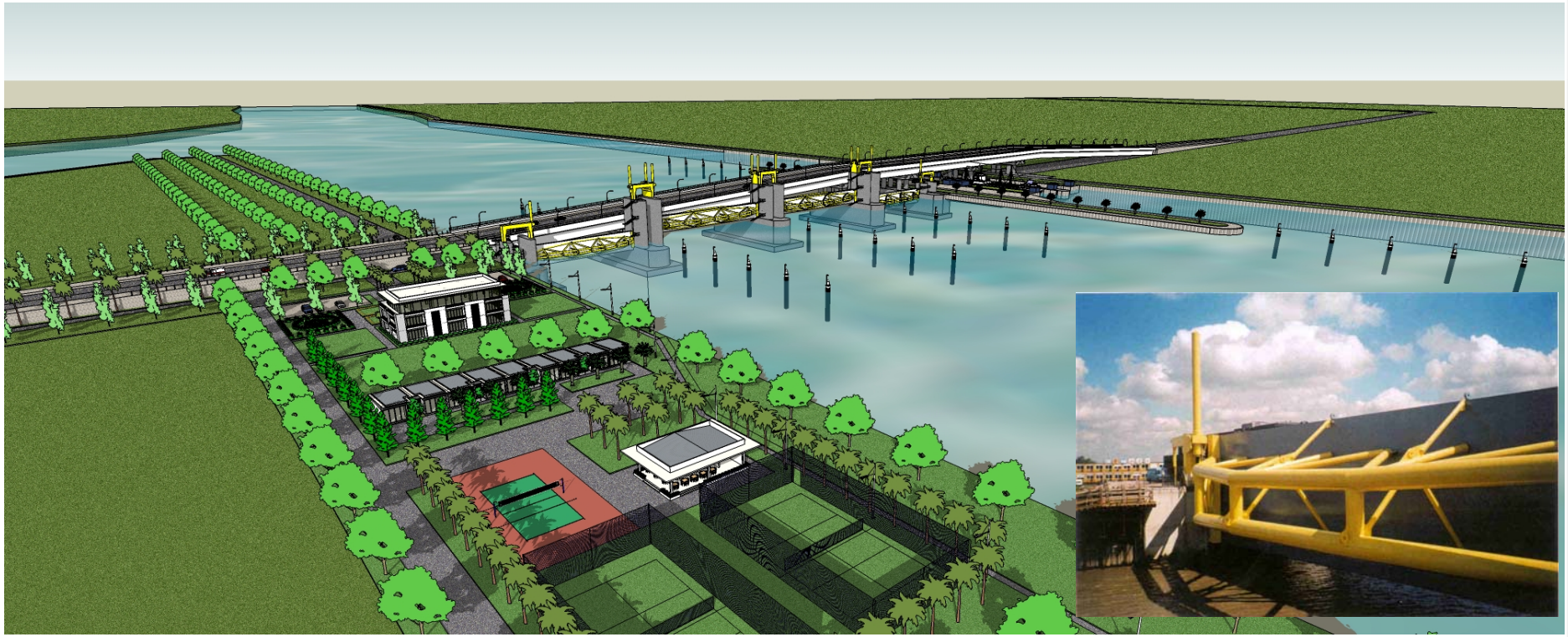
VỊ TRÍ TUYẾN ĐẬP

TUYẾN KÊNH DẪN HẠ LƯU

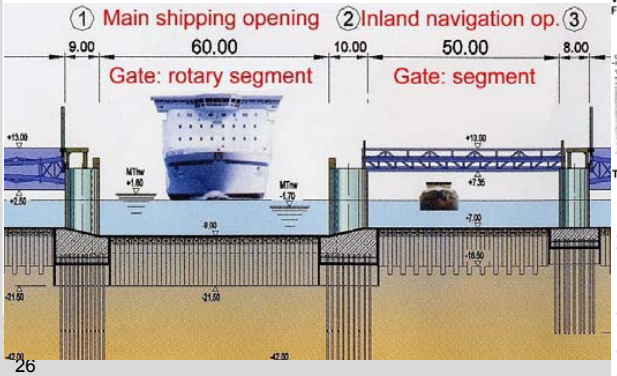
Variant No III Preferred

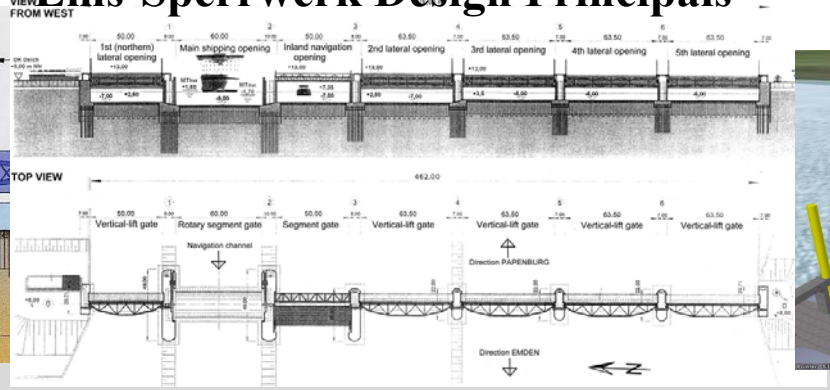
TUYẾN CỐNG PA 3

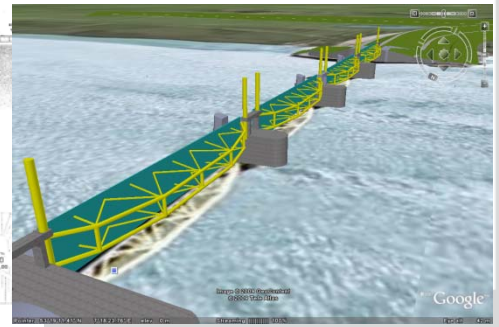
Thu Bo Barrier Design in Comparison to Ems-Sperrwerk / Germany



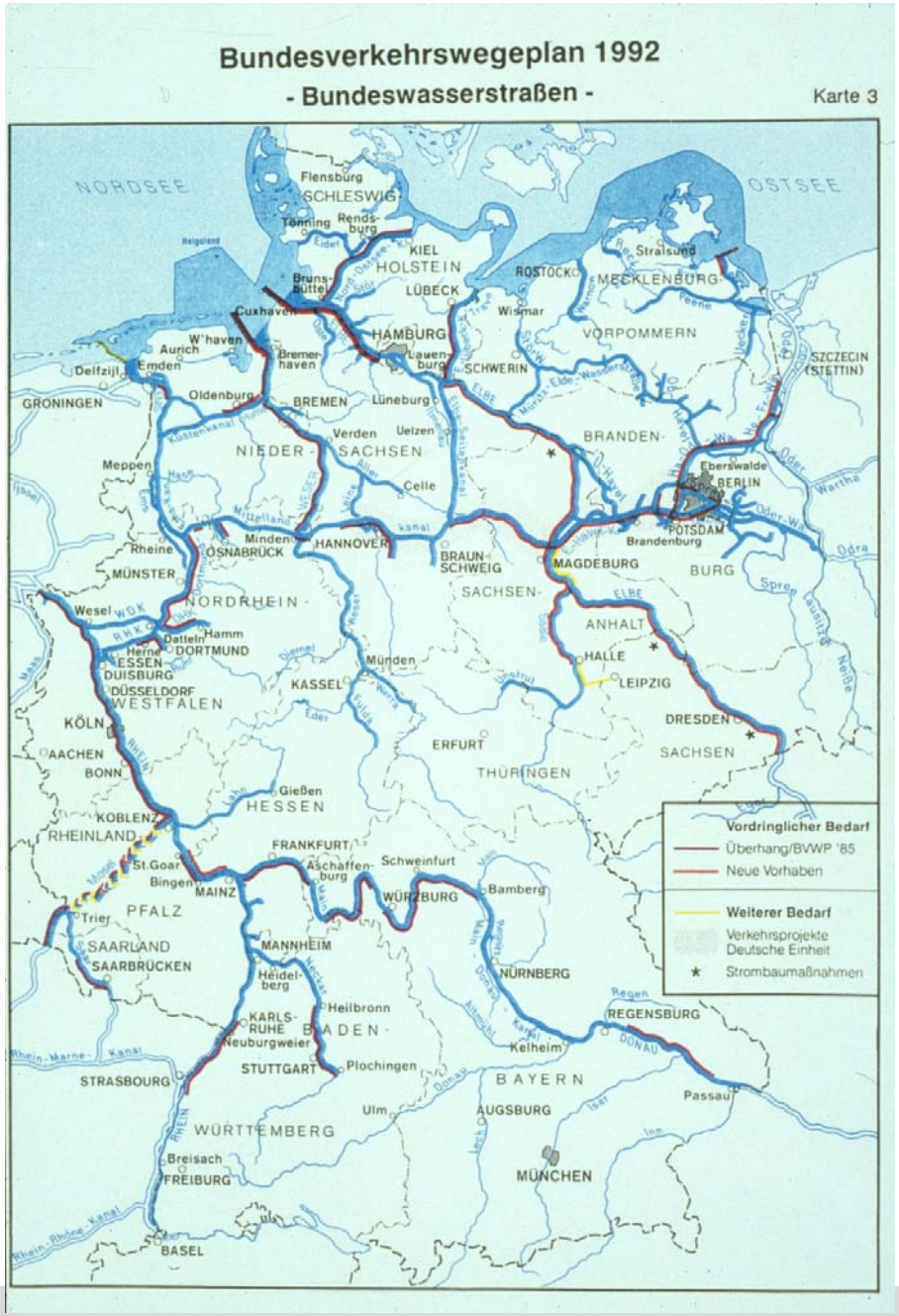
Ems-Sperrwerk Design Principals







Federal Waterways of Germany

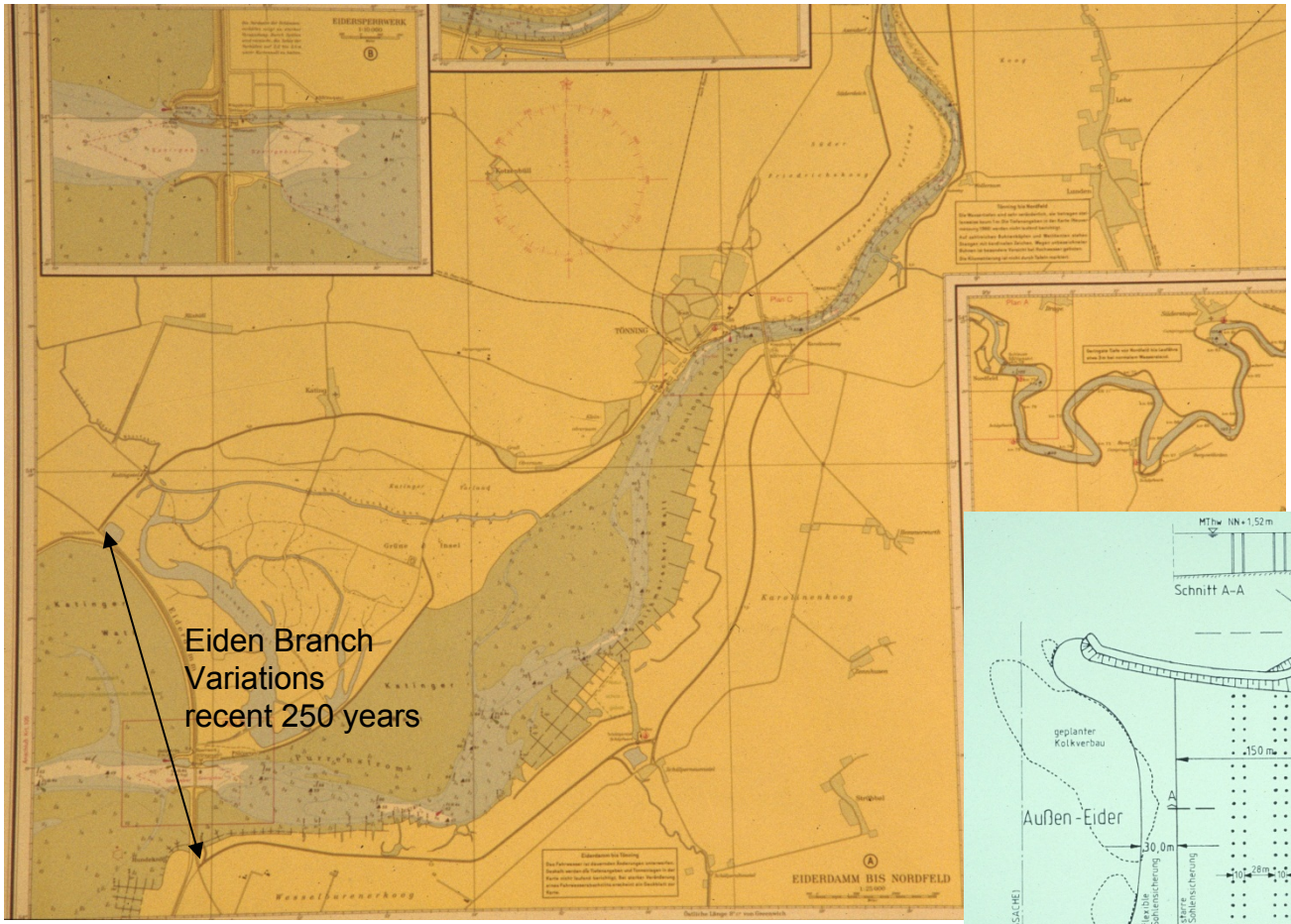


Eider Barrage

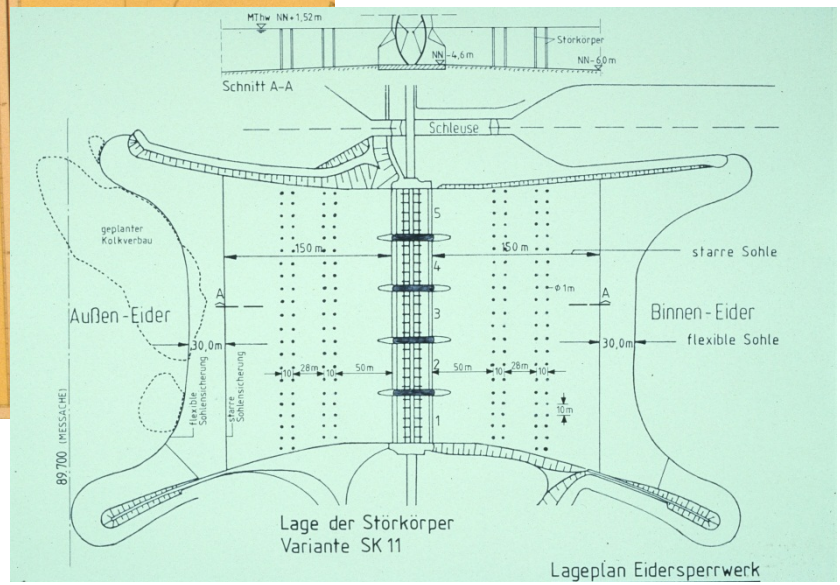
Aerodynamic studies at the Federal Waterways Engineering and Research Institute (BAW)

Nghiên cứu Khí Động Lực tại Viện Kỹ Thuật Đường Thủy Liên Bang (BAW)

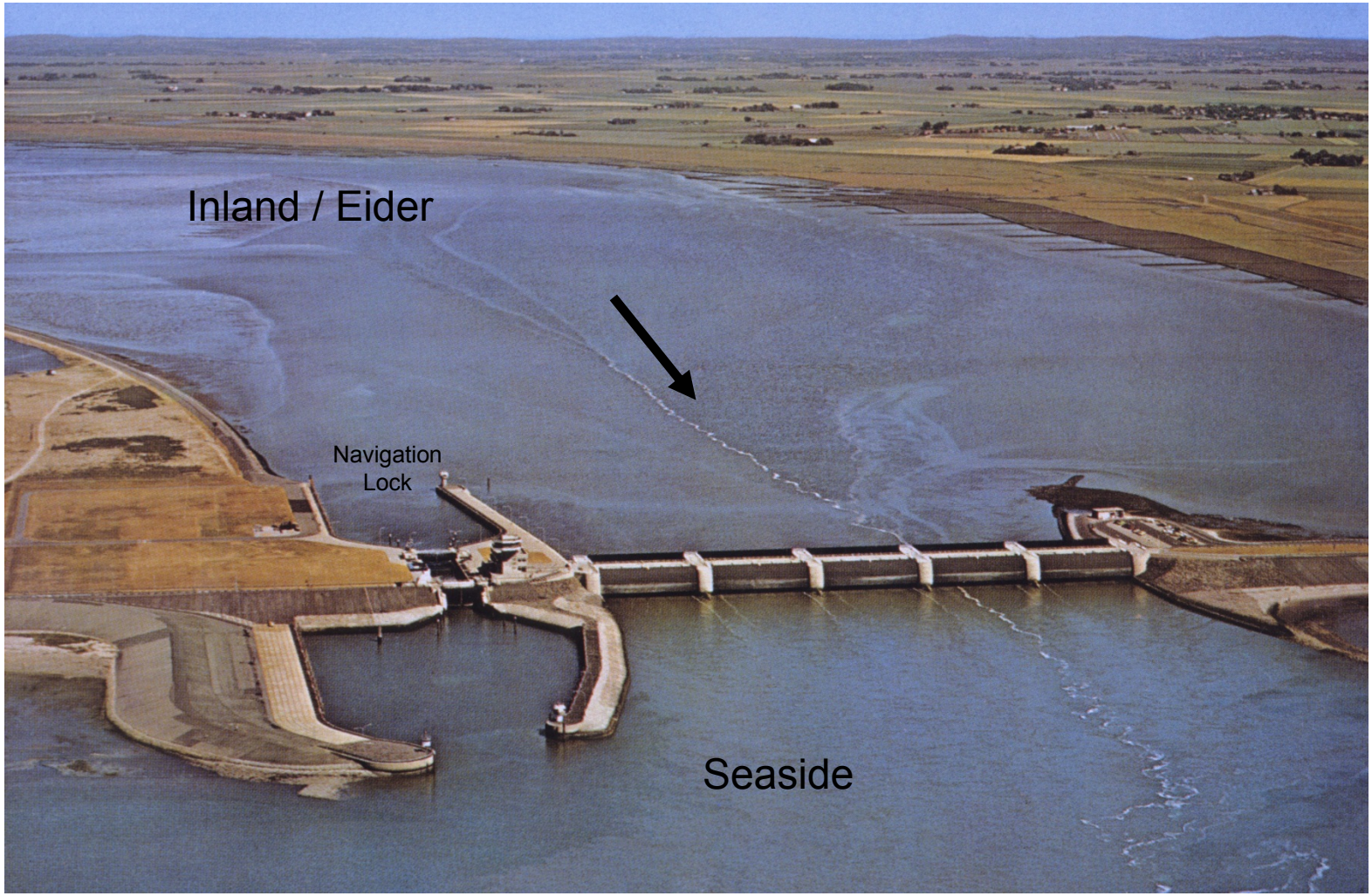
Construction 1972



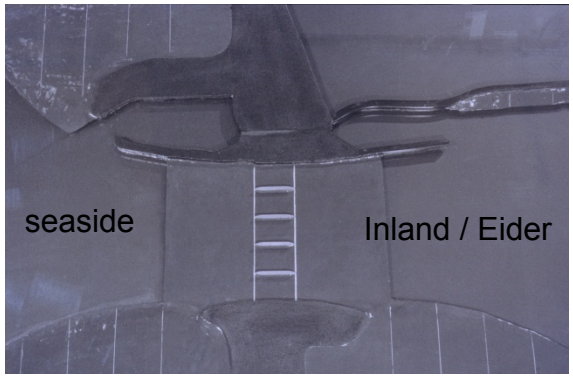
Position of Eider Barriage in 1972

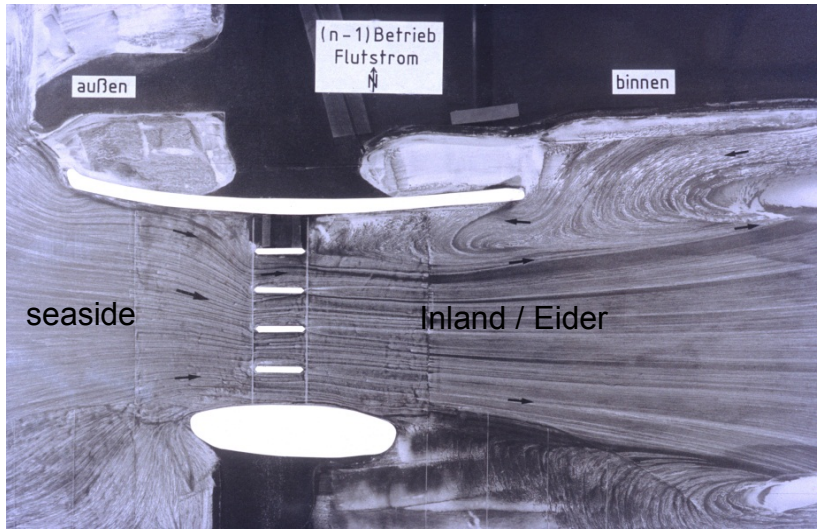


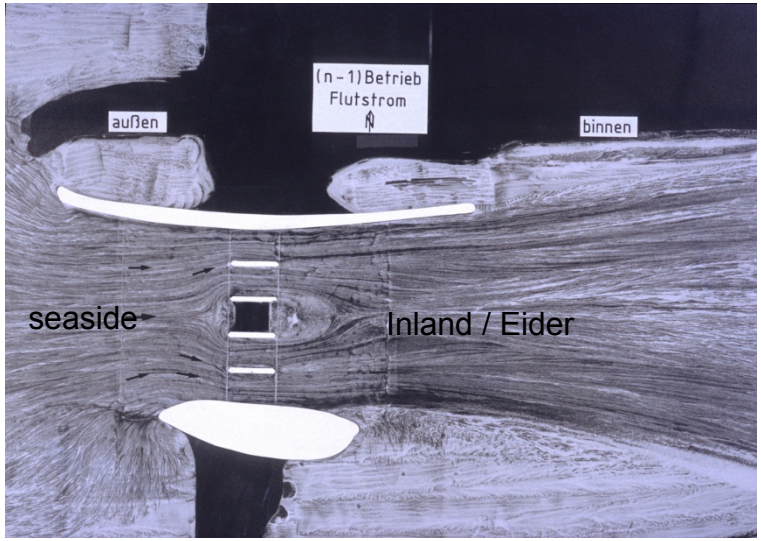
Construction

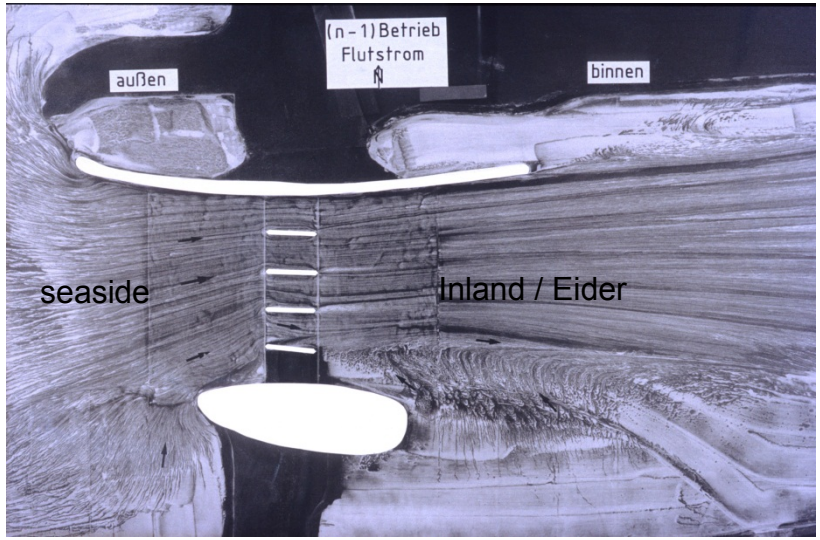


n-1 operation of the barrage / situation 1972

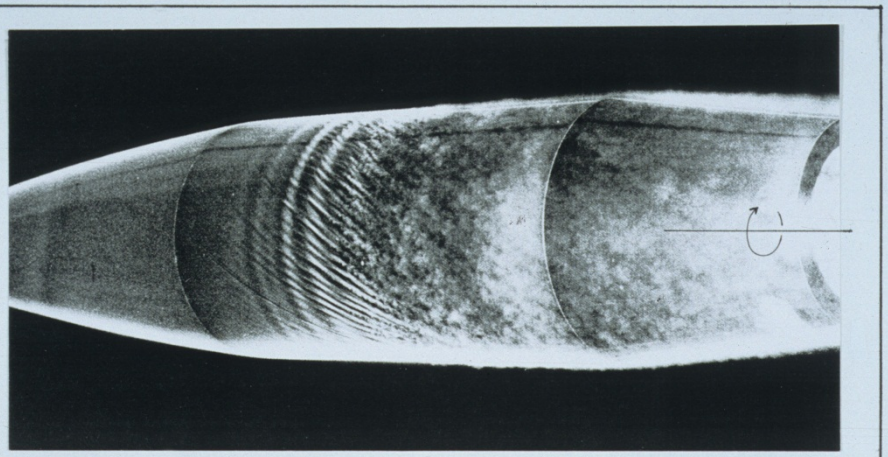






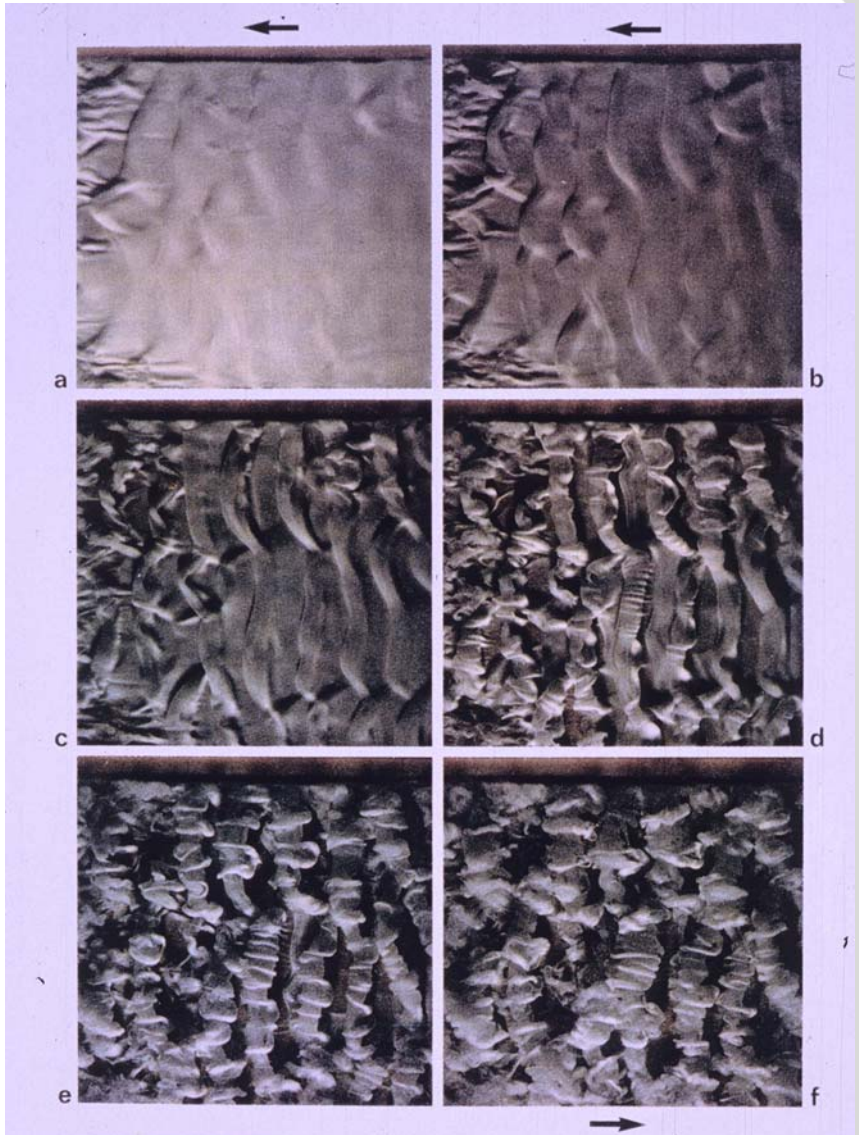


Physical background



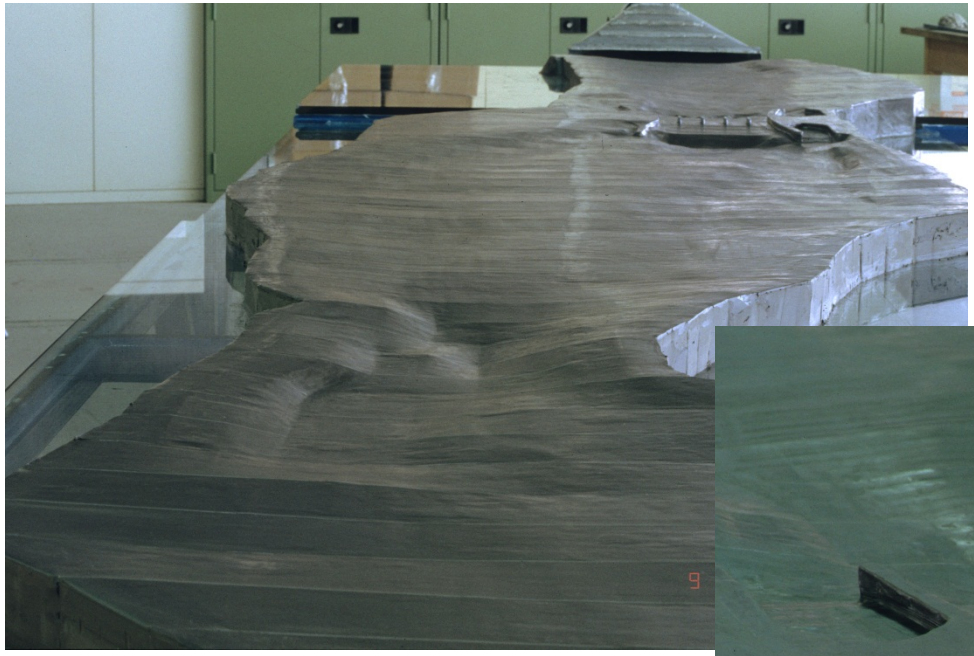
Sichtbar gemachte grenzschichtnahe Strömungsvorgänge an einem rotierenden Körper :
- spiralförmige Wirbel
- Tollmien-Schlichting Wellen
- turbulente Vermischung

BAW	Grenzschichtströmungen	FN

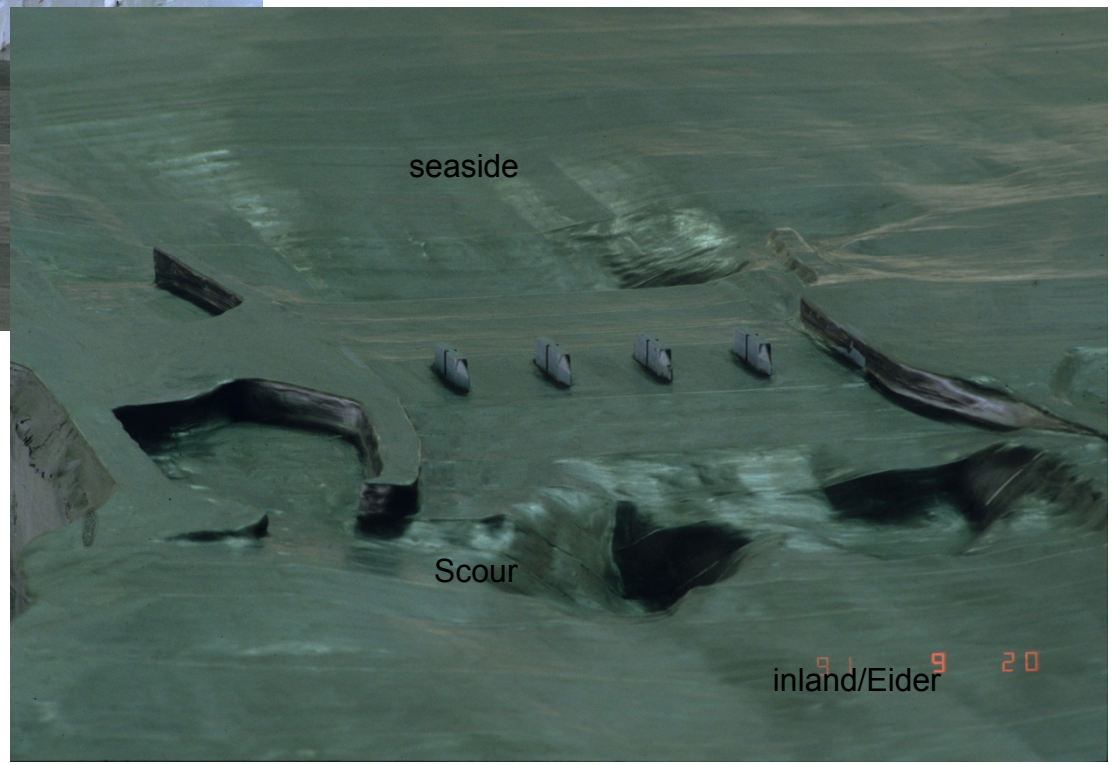


Umschlag von zunächst laminarer in turbulente Grenzschichtströmung
(instationär betriebener Strömungskanal, T.Hayashi u. M. Ohashi, 1982)

Construction of the aerodynamic Model



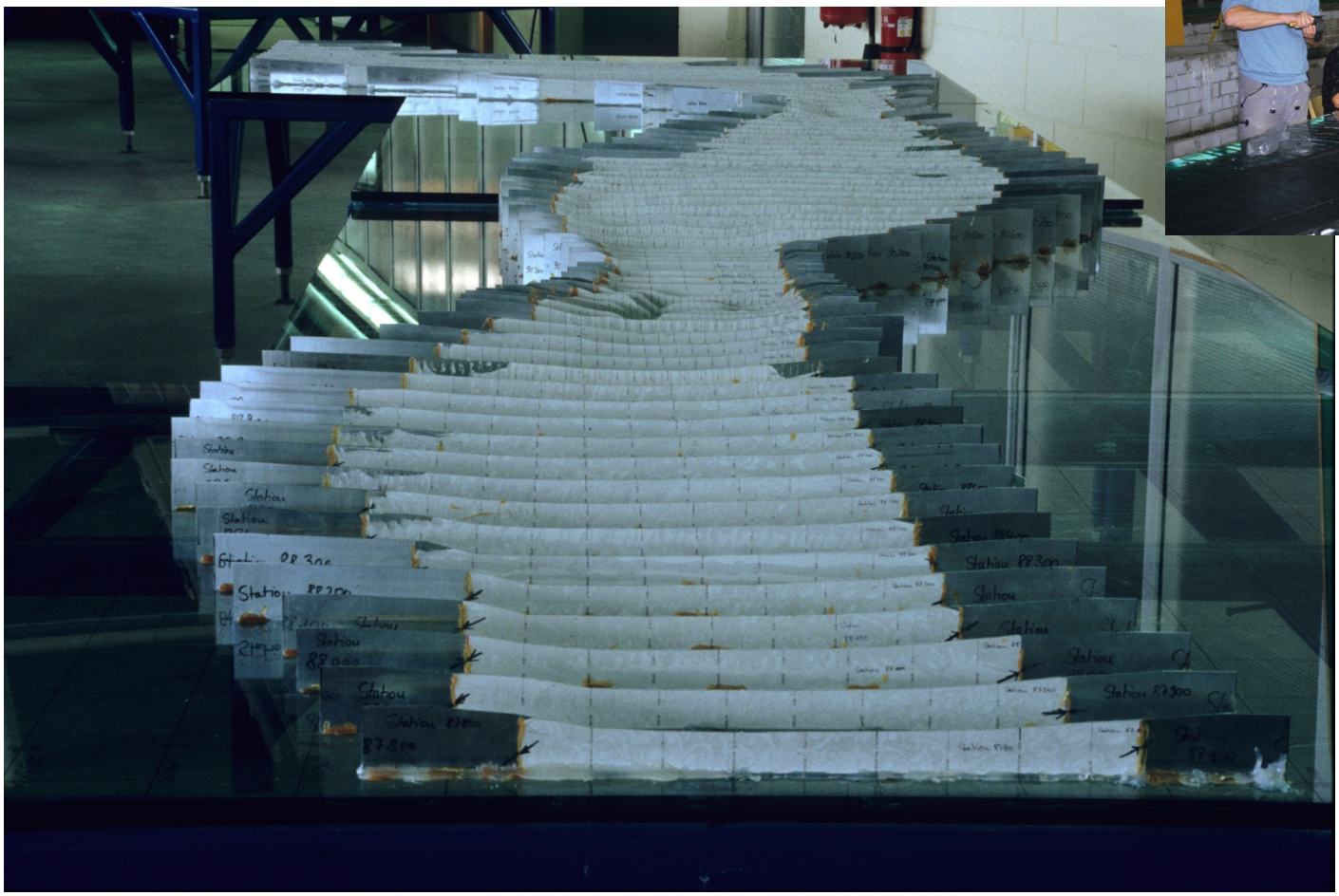
Eider Barriage Situation 1992



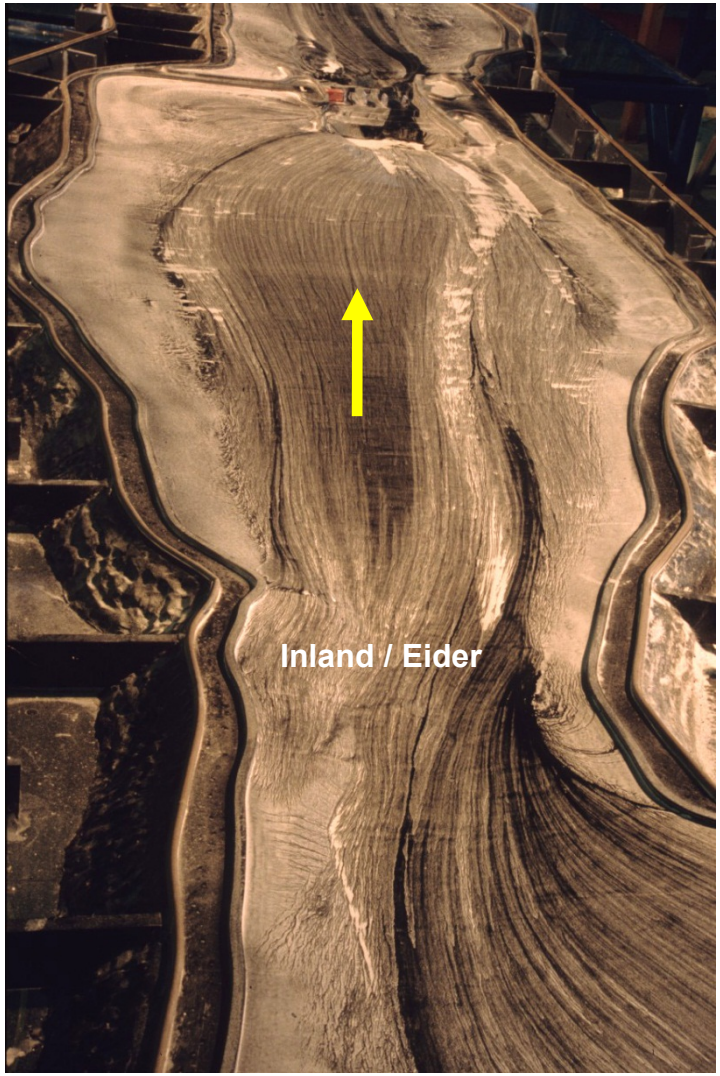
relative erosion-depths after 20 year operation of Eider Barriage; Scours up to 30 m deep!!

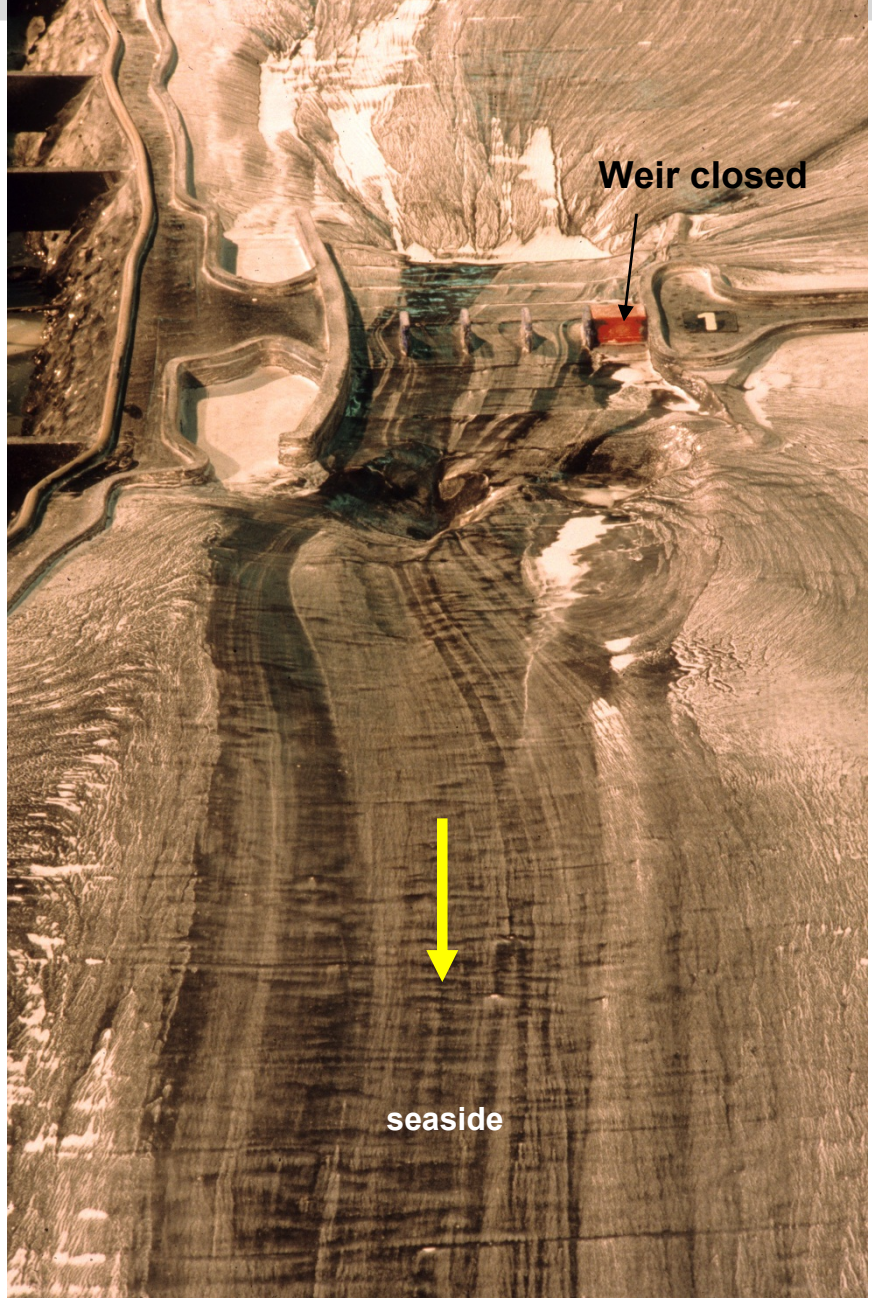
Construction of the aerodynamic Model

Situation of 1992

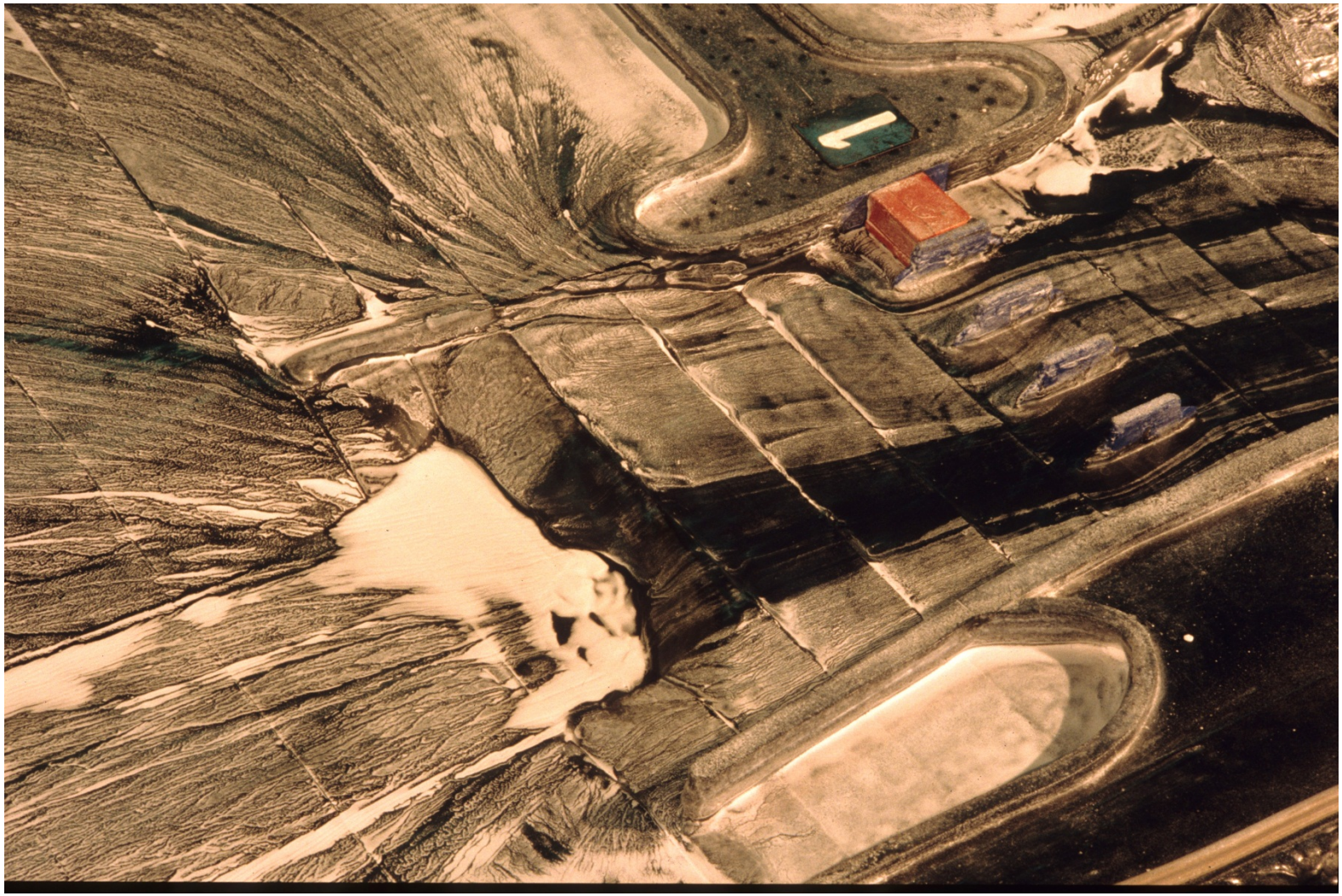


V1 – n-1 situation





V1 – n-1 situation



XIN CẢM ƠN !

Danke fuer Ihre Aufmerksamkeit !