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# Huai River Flood in 2003 and Its Forecasting, Prediction and Dispatching

## Liu Jinping (China)

Second Asia Pacific Hydrology and Water Resources Conference  
5-8 July 2004, Singapore

### Huai River Flood in 2003 and Its Forecasting, Prediction and Dispatching

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July 7, 2004

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Second Asia Pacific Hydrology and Water Resources Conference  
5-8 July 2004, Singapore

### Contents

- Description to Huai River Basin
- Huai River Flood in 2003
- Flood Forecasts and Prediction
- Flood Dispatching
- Conclusions

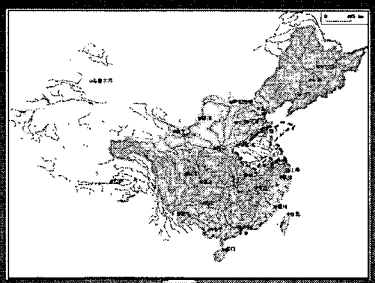


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### 1. Description to Huai River Basin

Huai River Basin is one of the 7 main rivers in China.



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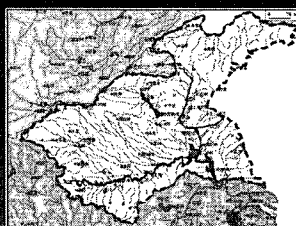
### 1. Description to Huai River Basin

Catchment Area  
270,000 km<sup>2</sup>


Length of river  
1000 km

Population  
100 millions

Annual precipitation  
910 mm



Map of Huai River Basin



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### 1. Description to Huai River Basin

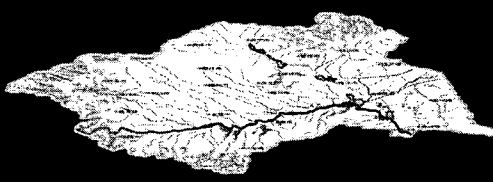



Table 1 Huai River Hydrographic Characteristics


Item	Upper course	Middle course	Lower course	Total
Area of basin (km <sup>2</sup> )	31,000	127,000	31,000	189,000
Length of river (km)	360	490	150	1,000
Main gradient	0.5%	0.053%	0.04%	0.2%




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### 1. Description to Huai River Basin



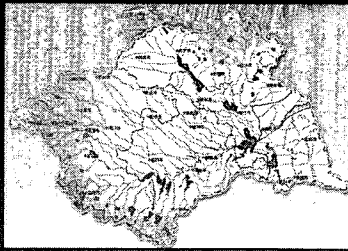
Reservoirs:  
Storage capacity:



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### 1. Description to Huai River Basin

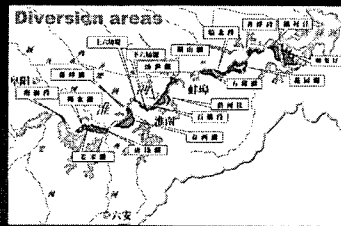


Large reservoirs:  
Storage capacity:  
Flood control storage:

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### 1. Description to Huai River Basin



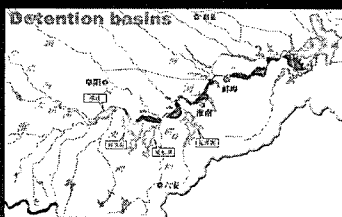
Diversion areas:  
Flow division:



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### 1. Description to Huai River Basin



Detention basins:

4 larges:



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### 1. Description to Huai River Basin



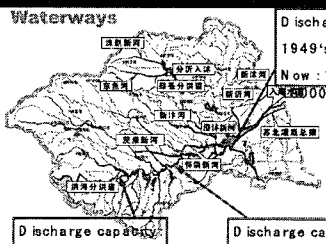
All-important  
Dams



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### 1. Description to Huai River Basin



Waterways

Discharge capacity

1949's

Now

2000

Discharge capacity

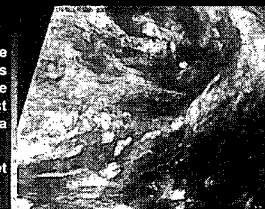


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### 2. Huai River Flood in 2003

In the summer of 2003:  
the subtropical anticyclone of the Northwest Pacific was much stronger than the normal and controlled most area of northern China incessantly.  
the southwest warm and wet current was prevailing.

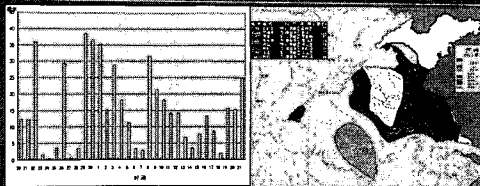


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### 2. Huai River Flood in 2003

Suffering from the abnormal climate, Huai River basin occurred heavy rainfall from June 20 to July 21 in 2003.  
The MAP amounts to 487mm which is more than twice as much as that in the same period of normal years.



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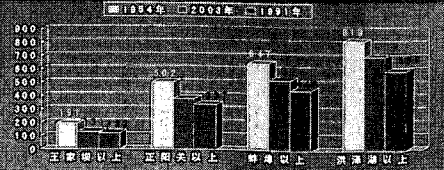
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### 2. Huai River Flood in 2003

Table 2 Precipitation in Huai River Basin in 1954, 1991 and 2003

Year Item	In 2003	In 1991	In 1954	Comparison	
	(a)	(b)	(c)	(a) and (b)	(a) and (c)
Max. 30-day-prec. (mm)	465	389	516	+20%	-10%
Water Volume on the Basin(10 <sup>9</sup> m <sup>3</sup> )	898	739	983		

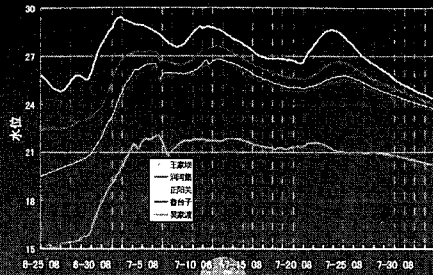
Note: The period in 1954 is 31 days



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## 2. Huai River Flood in 2003

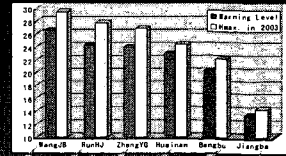


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## 2. Huai River Flood in 2003

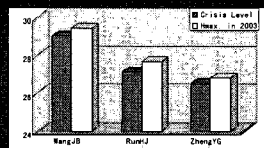
The water level of middle stream exceeded the by 1.37-3.36m.



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## 2. Huai River Flood in 2003



The water level of some reaches in middle stream exceeded the by 0.30-0.56m.

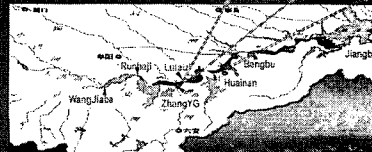
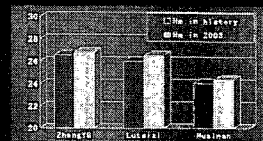


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## 2. Huai River Flood in 2003

The water level of some reaches in middle stream of main river exceeded the by 0.25-0.51 meters.



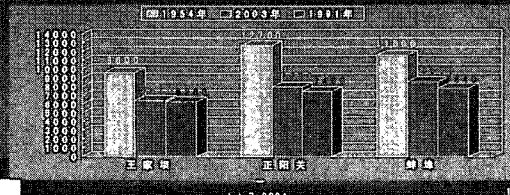
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## 2. Huai River Flood in 2003

Table 3 Max. Water Level and Discharge in large flood years

Year	Wangjiaba		Zhengyangguan		Bengbu		Jiangba
	H (m)	Q(m <sup>3</sup> /s)	H(m)	Q(m <sup>3</sup> /s)	H (m)	Q(m <sup>3</sup> /s)	H(m)
2003	29.42	6420	26.80	7980	22.05	8580	14.37
1991	29.56	6280	26.52	7480	21.98	7840	14.08
1954	29.59	9600	26.55	12700	22.18	11600	15.23



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## 2. Huai River Flood in 2003

Table The return period of flood in 1954, 1991 and 2003

Station	Year		
	1954	1991	2003
Wangjiaba (outlet of upstream)	20	<10	10
Zhengyangguan (Middle reach)	50	15	20
Zhongdu (outlet of Hongze)	50	20	30

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## 2. Huai River Flood in 2003

Affected population: 27,600,000

Inundated farmland: 4,000,000 mu

Total direct losses: 100 billion yuan



Dyke broke by flood



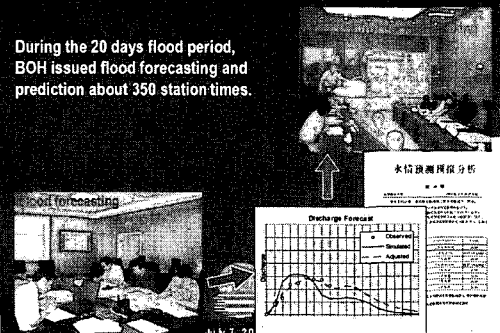
Tents for refugees



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## 3. Flood Forecasts and Prediction

During the 20 days flood period, BOH issued flood forecasting and prediction about 350 station times.



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### 3. Flood Forecasts and Prediction

Three results :

- (1) Forecasting continually to the whole river system combining with QPF to increase lead-time as soon as possible for early warning.
- (2) Forecasting aiming at the needs of flood control, water dispatching and water projects operation .
- (3)Forecasting for flood disaster rehabilitation .



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### 3. Flood Forecasts and Prediction

(1)Forecasting continually to the whole river system combining with QPF to increase lead-time for early warning.

- ◆ make the best of Quantitive Precipitation Prediction (QPF) from department of meteorology to produce daily stream flood prediction up to in advance for decision making of flood disaster preparedness including dweller evacuation from flood prone area and material redeploying for flood defense.



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### 3. Flood Forecasts and Prediction

Table Flood Predictions combining with QPF

Flood No.	Station	I.T.		Rainfall			Flood Predicted			Flood Observed	
		m d h	P.T.	Observed	Error	P.T.	P.L.	L.T.	P.T.	P.L.	
1	WangJIB	6.30.14	115mm(3d)	101mm	+13%	7.03.20	29.20	3d	7.03.04	29.41	
	Runheji	7.02.13	100mm(3d)	67mm	+50%	7.07.02	27.50	5d	7.06.02	27.32	
	ZhengYIG	6.30.14	155mm(3d)	76mm	+103%	7.06.02	26.90	6d	7.06.15	26.55	
	Wujiadu	7.04.15	145mm(4d)	57mm	+154%	7.10.08	22.60	6d	7.06.22	22.05	
	Wangjiaba	7.06.15	96mm(4d)	55mm	+74%	7.11.20	25.80	5d	7.11.2	28.87	
2	Runheji	7.10.20	25mm(1d)	21mm	-19%	7.13	27.70	3d	7.11.17	28.65	
	ZhengYIG	7.10.15	30mm(1d)	24mm	+25%	7.13	26.80	3d	7.12.19	26.80	
	Wujiadu	7.10.20	45mm(1d)	24mm	+87%	7.15	22.30	5d	7.14.01	21.85	
	Hongzhu	7.10.20	20mm(1d)	16mm	+25%	7.15	14.50	4d	7.14.16	14.37	



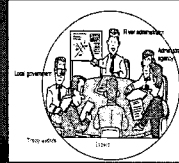
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### 3. Flood Forecasts and Prediction

(2) Forecasting aiming at the needs of flood control, water dispatching and water projects operation.

Based upon real-time information of rainfall, river stream flow and water projects produced continual flood forecasting to the whole river system from upstream to downstream up to in advance for flood disaster prevention including flood water dispatching, water projects operation and flood fighting.



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### 3. Flood Forecasts and Prediction

Table The list of some results of Forecasts

Flood No.	Station	I.T.		Forecasted		Action on water projects	Observed	
		m d h	P.T.	P.L.	L.T.		P.T.	P.L.
1	WangJIB	7.02.14	7.03.12	29.55	1d	Operate Mengwa Detention area	7.03.04	29.41
	Runheji	7.04.08	7.04.12	27.30	4h	Operate Chuanhuai Waterway and TangDH detention area	7.06.02	27.32
	ZhengYIG	7.06.08	7.07.08	26.70	1d		7.06.15	26.55
	Wujiadu	7.04.15	7.07	22.30	3d	Operate Jialong in Waterway	7.06.22	22.05
	Hongza Lake	7.09.08	7.14.08	14.40	5d	Operate Ruhai Waterway	7.14.15	14.37
2	Wangjiaba	7.10.15	7.11	28.80	1d		7.11.2	28.87
	Runheji	7.11.08	7.12	27.80	1d	Operate Mengwa, ChengDH, Qiujiayu detention areas and XiangHD Reservoirs	7.11.17	28.65
	ZhengYIG	7.11.08	7.13	26.80	2d		7.12.19	26.80
	Runheji	7.13.19	7.14.20	27.18	1d	Close Mengwa, Changdonghu detention areas	7.14.14	27.08
	ZhengYIG	7.13.19	7.14.08	26.58	1d		7.14.12	26.49
3	Wujiadu	7.10.15	7.15	22.10	5d	Operate Huatongjinhe waterway	7.14.01	21.85
	Hongza Lake	7.10.20	7.14	14.40	5d	Operate Ruhai waterway	7.14.16	14.37
	Wangjiaba	7.21.20	7.23.23	28.80	3d		7.24.05	28.54



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### 3. Flood Forecasts and Prediction

(3) Forecasting for flood disaster rehabilitation.

◆ In order to meet the demands of promoting what is beneficial and abolishing what is harmful, hydrologists provided the recession prediction up to in advance in the later period of Huai river flood.

Flood disaster rehabilitation including: drainage from inundated area, flood-water utilization, reconstruction of water projects, dwellers allocation and etc.



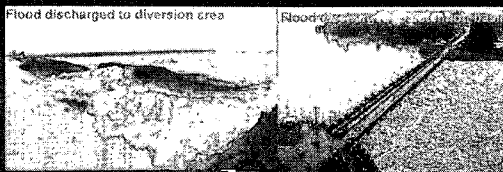
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### 4. Flood Dispatching

The new idea, namely from man passively conquer nature to that man positively steer nature has been put into full operation in whole period of flood in 2003.

The main reservoirs and water projects were operated on man's own initiative, the maximum flood control benefit brought into play.



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### 4. Flood Dispatching

During 2003 Huai river flood, 5 main reservoirs played remarkable role in storing floodwater and reducing flood peak. Total about 2 billion m<sup>3</sup> floodwater was stored.

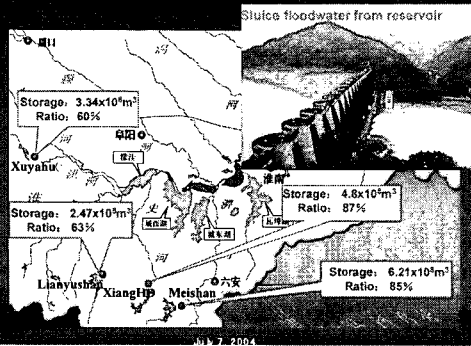
Name	Max. water level (m)	Max. Storage volume (10 <sup>8</sup> m <sup>3</sup> )	Time (m.d.h)	Max. in flow Q <sub>1</sub> (m <sup>3</sup> /s)	Time (m.d.h)	Max. out flow Q <sub>2</sub> (m <sup>3</sup> /s)	Time (m.d.h)	Reducing ratio (%)
Xuyahu	54.20	4.46	7.05.07	2090	7.02.02	844	7.08.06	59.6
LiaoYSH	109.31	6.21	7.11.22	1810	7.10.11	667	7.10.17	63.1
Meishan	131.31	15.8	7.11.16	7400	7.10.12	975	7.11.16	86.8
XiangHD	129.11	14.8	7.12.13	5910	7.10.10	884	7.10.22	84.8
Fuziling	119.01	2.7	7.10.19	2890	7.10.15	1840	7.10.19	37.1



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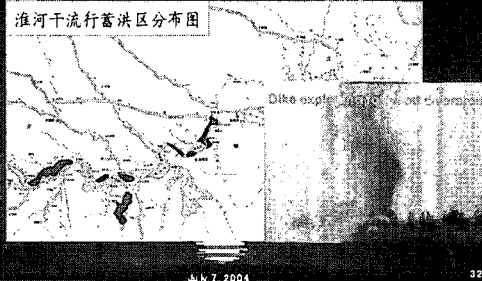
#### 4. Flood Dispatching



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#### 4. Flood Dispatching

During the 2003 Huai river flood, totally there were 2 detention basins and 7 diversion areas to be put into use for flood detention.



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#### 4. Flood Dispatching

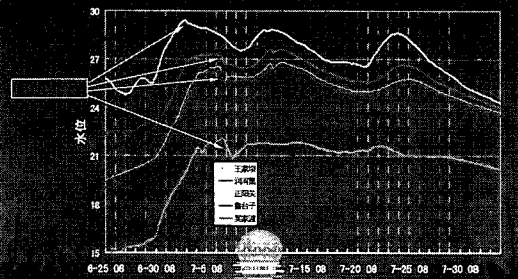
The total retarded water volume was about  $28 \times 10^9 \text{ m}^3$ .

Name	Control station name	Flood No. 1		Flood No. 2		Flood No. 3		Total
		Opern Time	Water Volume	Opern Time	Water Volume	Opern Time	Water Volume	
Mengwa	WangJB	7.03.01	2.03	7.11.02	3.58			
Chuangdongtu	Dougf1231			7.11.14	3.00			
Qiujiahu	Wangji			7.11.17	2.77	7.24.20	0.39	
Tangduochu	ZhengYG	7.06.15	4.80	7.12.22	0.84	7.25.10	0.62	
Up	Liufangdi	Fengtai	7.06.16	1.78	7.13.02	0.00	7.25.16	0.15
Down	Shiyaduan				1.23		0.24	
Luohewa	Huainan	7.06.21	1.80	7.13.22	0.14	7.23.08	0.1	
Jishanbu					4.09		0.16	

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#### 4. Flood Dispatching

The operation of detention basins played very important role to reduce the water level of middle reach of a river.



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#### 4. Flood Dispatching

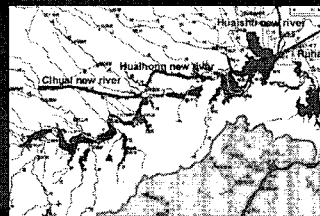
During the 2003 Huai river flood, some important man-made water ways were put into use for floodwater diversion and played a key role for flood control.

Station	First flood		Second flood	
	Peak level	Dropped	Peak level	Dropped
WangJB	29.42m	0.36m	28.87m	0.13m
Runheji	27.32m	0.58m	27.66m	0.26m
ZhengYG	26.53m	1.13m	26.80m	0.32m
Lutai	26.31m	0.97m	26.49m	0.24m
Huainan	24.37m	1.25m	24.18m	0.07m
Wujedu	22.05m	1.22m	21.85m	

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#### 4. Flood Dispatching

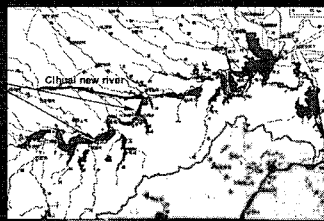
During the 2003 Huai river flood, some important man-made water ways were put into use for floodwater diversion and played a key role for flood control.



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#### 4. Flood Dispatching

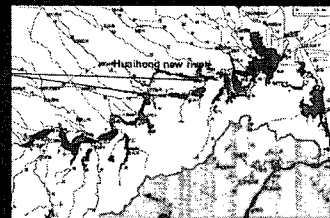
The water level of reach from Zhengyangguan to Huainan was decreased about 0.15m.



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#### 4. Flood Dispatching

The water level from Bangbu to Xiaoliuxiang was played down about 0.5m.

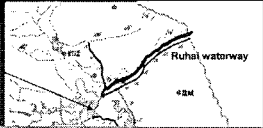


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#### 4. Flood Dispatching

that conducts water from Hongze Lake to Yellow Sea. The gate was opened on July 4 and closed on August 6. It discharged  $44 \times 10^8 \text{ m}^3$  of water from Hongze Lake and lowered water level 0.4m.

The water level of Hongze Lake would be 14.77m instead of 14.37m if Rukai waterway could not be



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#### 4. Flood Dispatching

Table Comparison of Flood Disaster in 1991 and 2003

Year	Inundated farmland (million hm <sup>2</sup> )	Affected people (million)	Died people	Ruin house (million)	Total losses (billion Yuan)
2003	3.85	37.30	29	0.77	28.6
1991	5.52	54.23	572	1.96	33.9
1954	4.31	No data	1930	1.98	No data
1990's	2.07	No data	-	0.35	10.3



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#### 5. Conclusions

Real-time flood forecasts and prediction must be closely integrated with the actual demands of flood disaster prevention, reduction and mitigation so that the real-time flood forecasting and prediction can play more key effect in the supporting of flood control decision-making.

A new conception, i.e. from man conquer flood to that man should harmoniously co-exist with flood, from the practice of preventing water from harming man to that of paying special attention to effectively manage water, is understood and accepted by people day by day.

Scientific regulation of flood added with effective administration of government is the key to successful control of flood in 2003.



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Second Asia Pacific Hydrology and Water Resources Conference  
5-8 July 2004, Singapore

Thanks!

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# NATIONAL STANDARDS TECHNICAL SPECIFICATION FOR RIVER WORKS IN LAO PDR Bounphet Phommachanh (Lao PDR)

MCTPC, DOR, Waterways Administration Division  
NILIM session in the Second Asia Pacific  
Hydrology and Water Resources  
Conference, 5-7 July 2004, Singapore



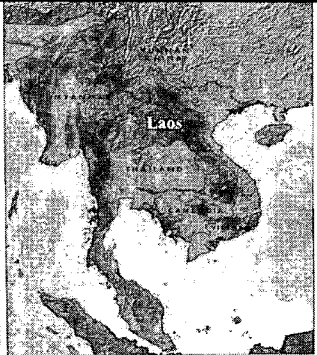

## National Standard Technical Specification for river works in Lao PDR

*Bounphet Phommachanh, Deputy Director of WAD*


## TOPICS



### Laos in South-East Asia

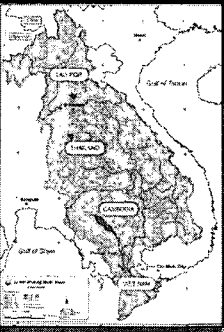


### Laos in the lower Mekong Basin



## Introduction

- Name: Lao People's Democratic Republic
- Area: 236,800 sq km.
- Population: 5.2 million (2002).
- GNP or GDP: 320 US\$ (2002)
- Capital city: Vientiane.
- Bordering: China, Myanmar, Thailand, Cambodia and Vietnam.
- Altitude: 90-1500 m above MSL.
- Climate: Tropical, monsoon.
- Temperature: 15°C to 33°C
- Rivers: Mekong River through Lao PDR about 1,898 km and 22 tributaries.
- Total rainfall runoff :
  - 35% from Laos contributes of whole flow in the Mekong River as average is about 26 m<sup>3</sup> billions per annum (whole 74 m<sup>3</sup> billions ) and per capita discharges of 37,000 m<sup>3</sup>/c.



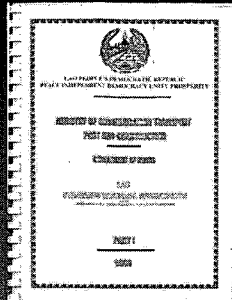
## FOREWORD

- This presentation has been prepared to introduce and demonstrate the current National Standard Technical Specification for river works in Lao PDR.
- Standard technical specifications are mostly project specific or donors oriented. We the recipient Country are appreciative of Donor standards specifications or the internationally recognized equivalents as approved by the Engineer.
- However, we need to have our own National Standard Technical Specification for standardization and unity on a countrywide basis.



WE HAVE LAO STANDARD TECHNICAL SPECIFICATION FOR ROAD, WHAT IS REQUIRED IS A MODEL FOR RIVER WORKS

- DIVISION 0: General requirement
- DIVISION 1: General provision
- DIVISION 2: Earth works
- DIVISION 3: Pavement structure
- DIVISION 4: Concrete structure
- DIVISION 5: Drainage, protection and strengthening work
- DIVISION 9: Road appurtenances, special and miscellaneous work



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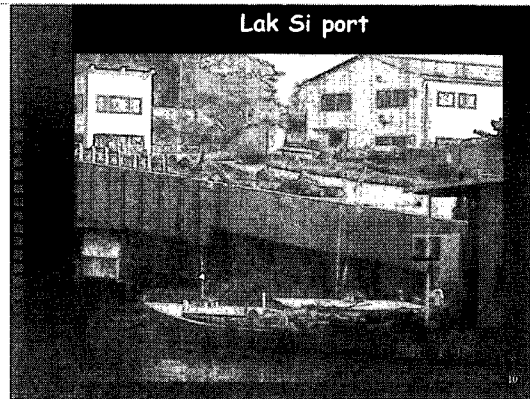


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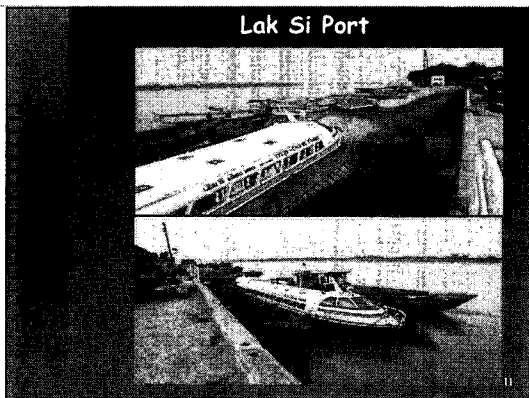
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Lak Si port



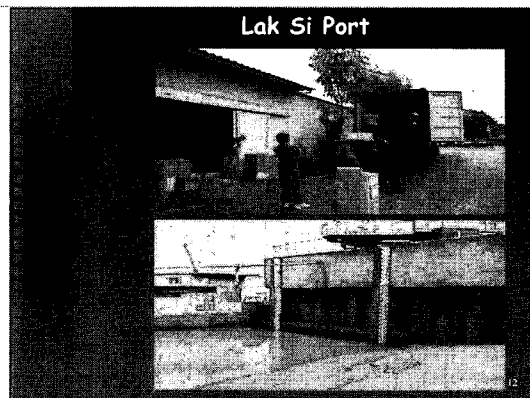
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Lak Si Port



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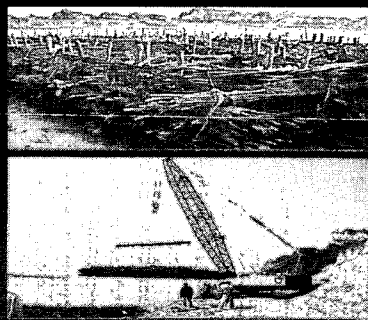
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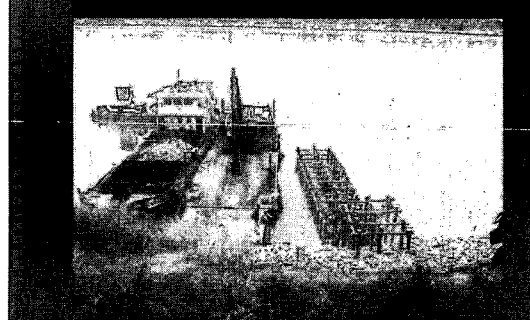
Bank protection in Vientiane City

Soda mattress system

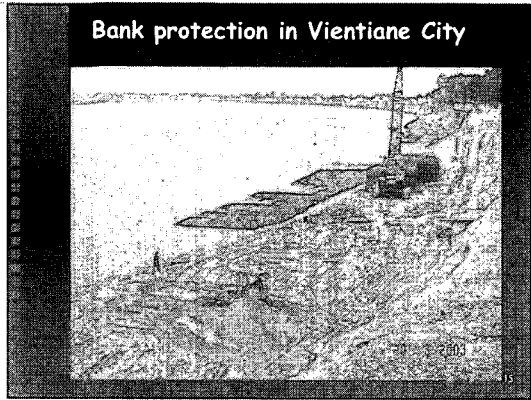


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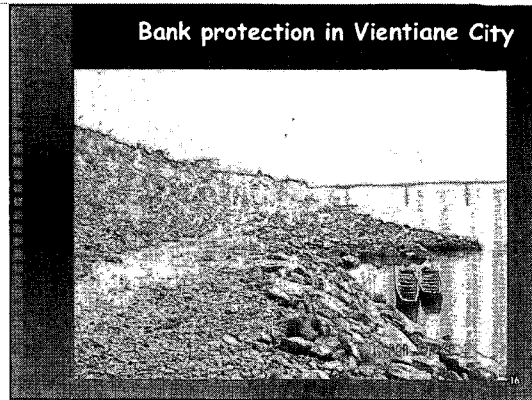
Bank protection in Vientiane City



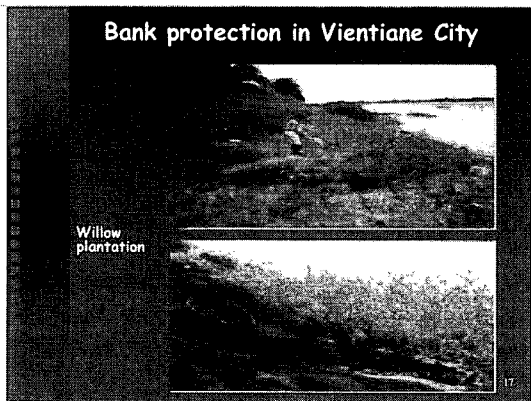
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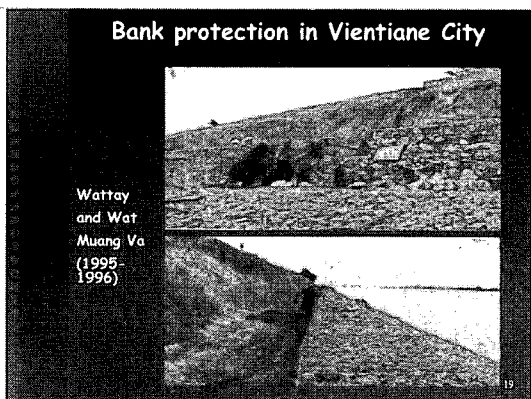
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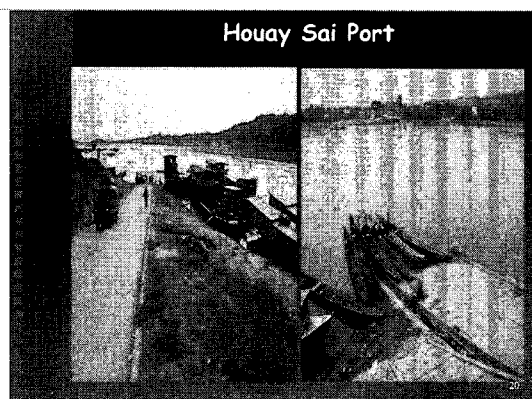
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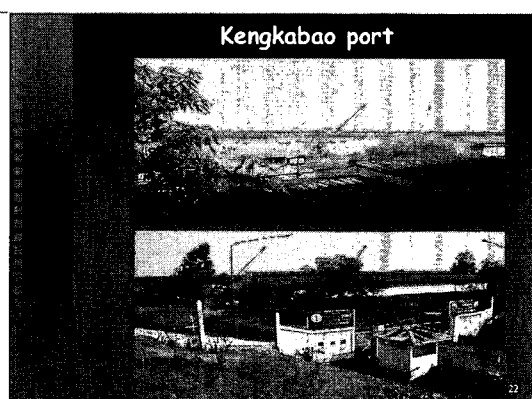
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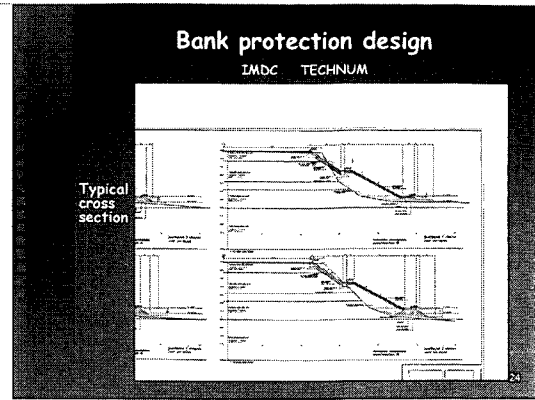
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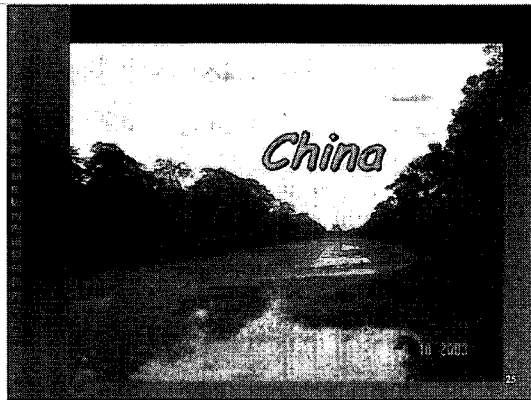
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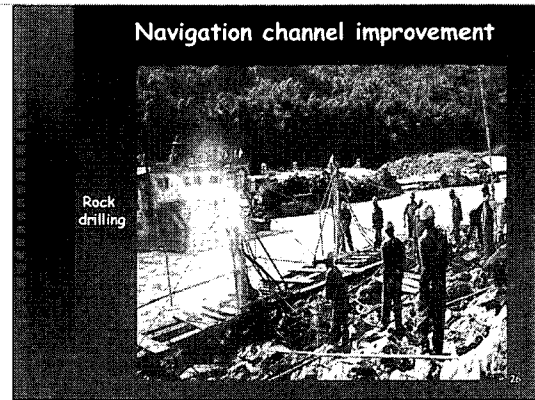
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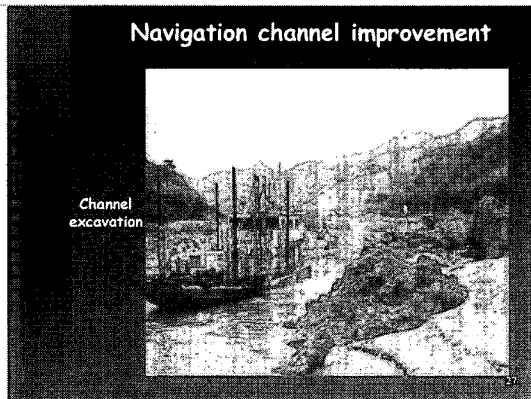
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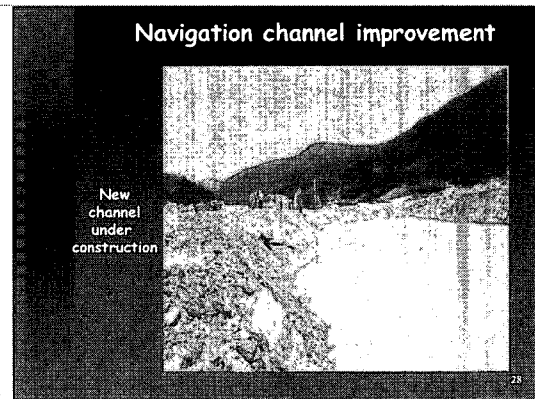
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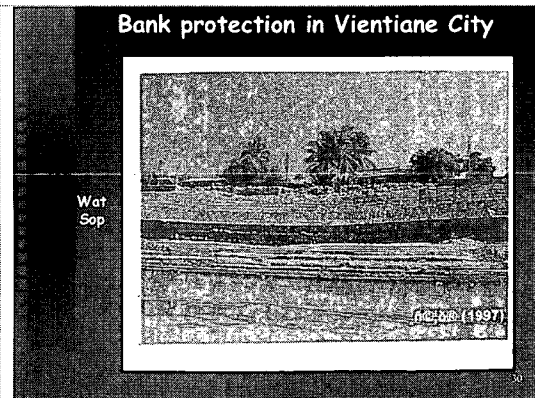
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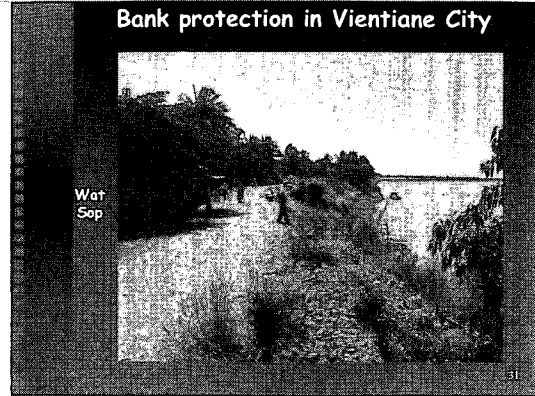
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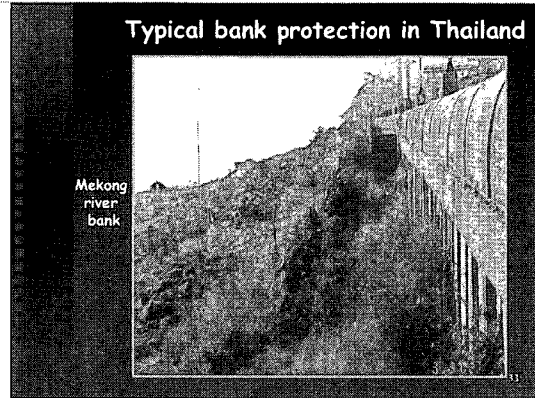
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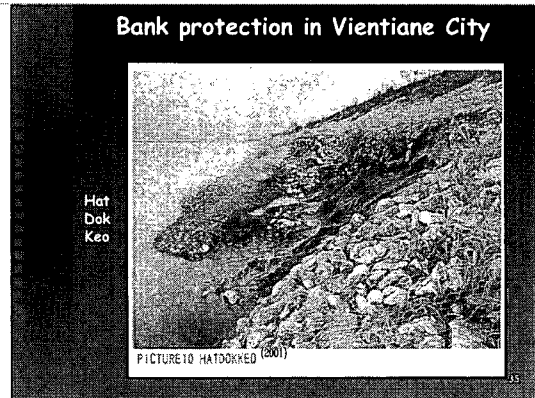
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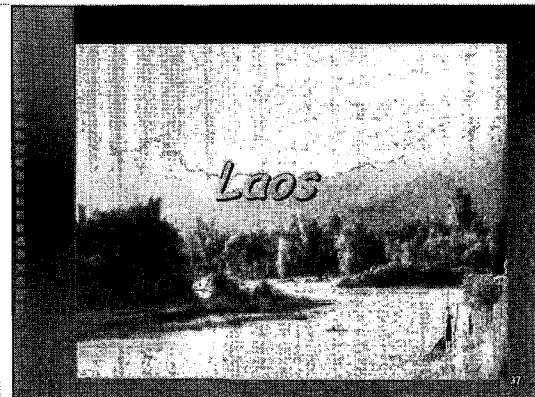
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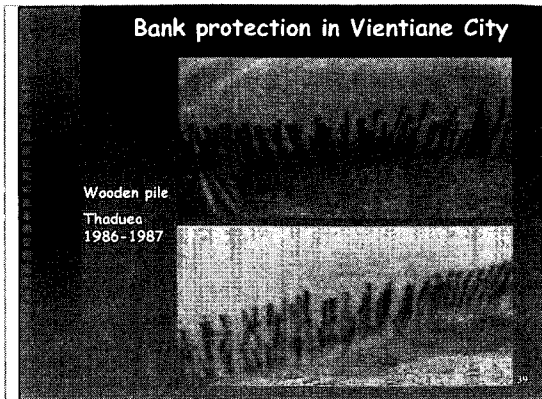
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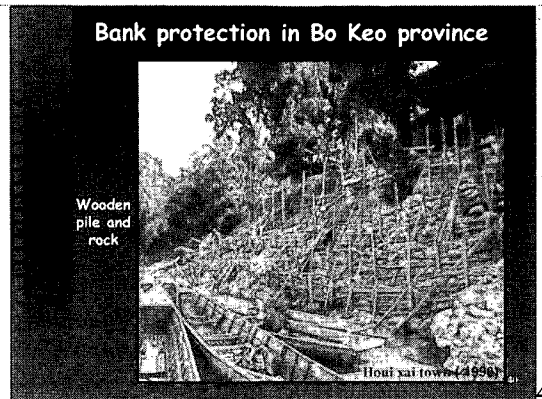
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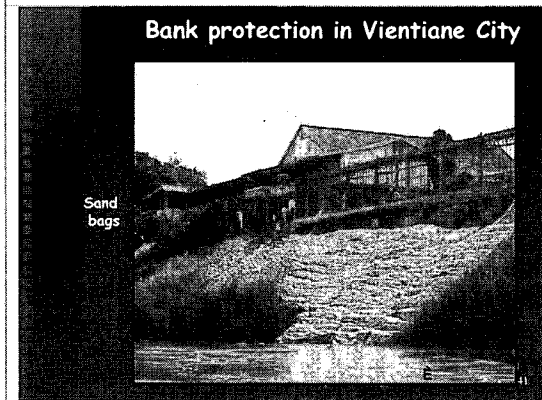
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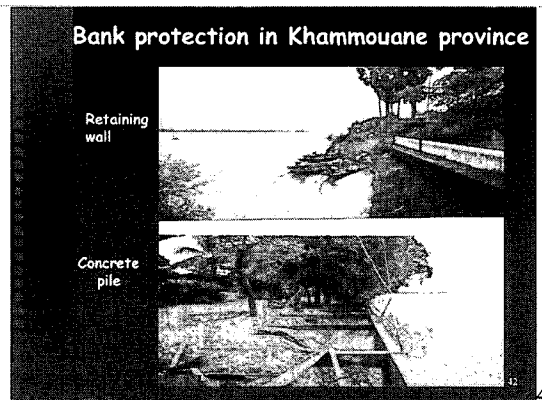
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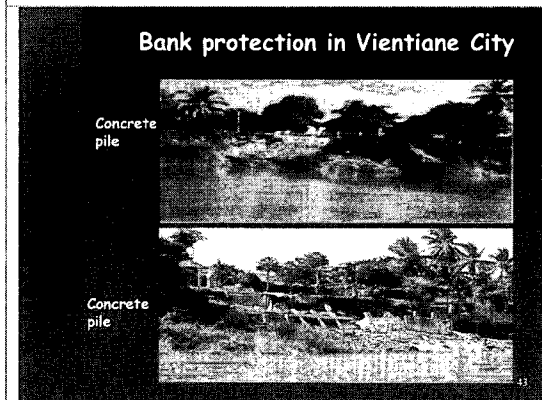
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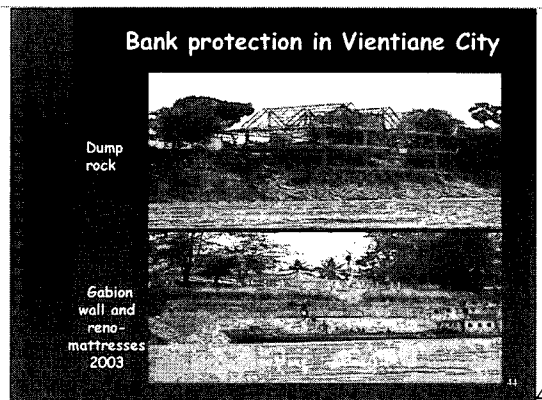
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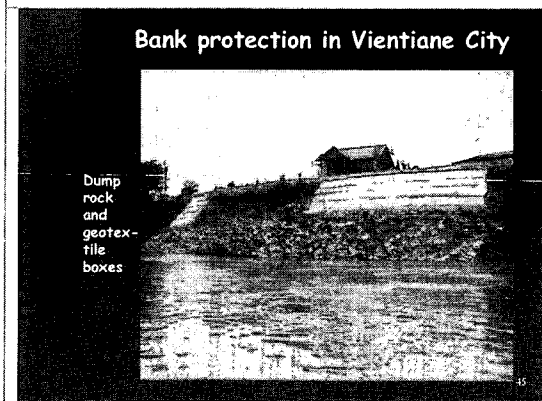
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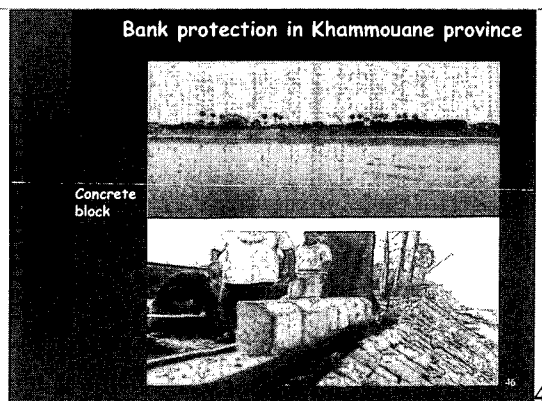
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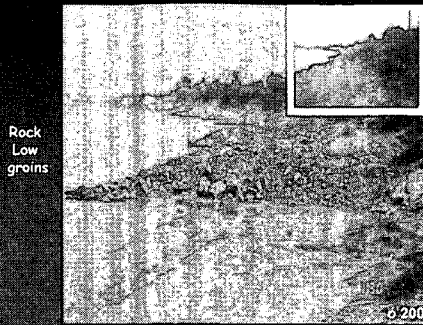


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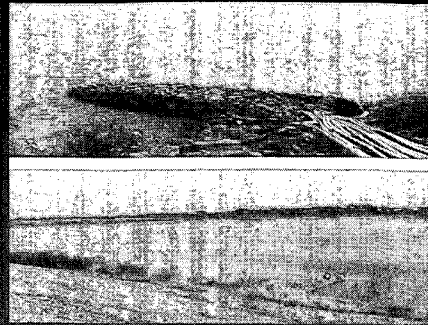
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### Bank protection in Bo Keo province



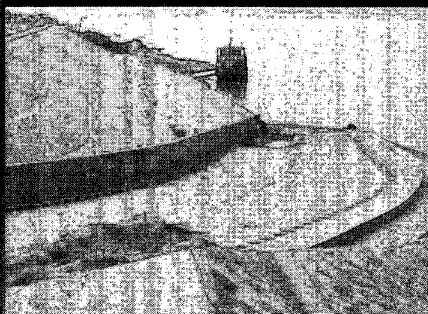
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### Rock Low groins



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### Ban Mom Port



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### CONCLUSION

- Ministry of Communication Transport Post and Construction, Department of Roads, Waterways Administration Division is responsible for establishing the national standard technical specification for river works.
- International technical experts to work with the Lao technical staff to develop the CODE for standard technical specification for river works.
- One country need one standard technical specification.

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### Conclusion (cont. 1)

- Technical cooperation should base on the national standard technical specification,
- Strengthening of the national capacity building for planning and management,
- NSTS is tool for government staff to manage and monitor the river works in term of planning and supervision.

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### Conclusion (cont. 2)

- Several studies were carried out by international experts and consultants, but no one study has come up to the requires NSTS level,
- Difference in the standard technical specification makes it difficult for management and supervision,
- National standard technical specification is critical needed to unity the specification and to avoid the many diverse on imported standard,

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### Conclusion (cont. 3)

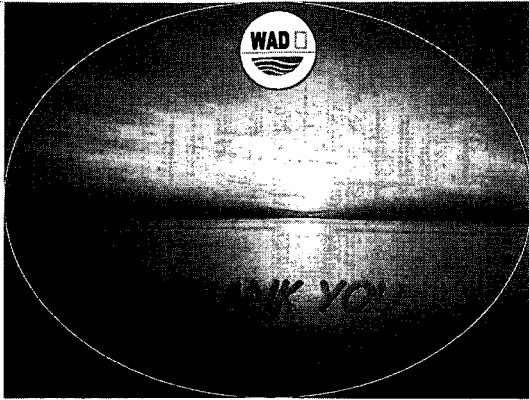
- Difficult to work on the macro level with planning and budgeting,
- Low efficiency on project management,
- Lack of unity of standards,
- National staff not interest to set up their own standards.

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### Conclusion (cont. 4)

- Donor money is powerful and we might say to things we would not have chosen otherwise,
- Donor countries represent different standards; each country naturally favors its own standards,
- Some international standard may not appropriate for Lao condition resulting in the failure on (being entirely unstable) of some river project after hand over.

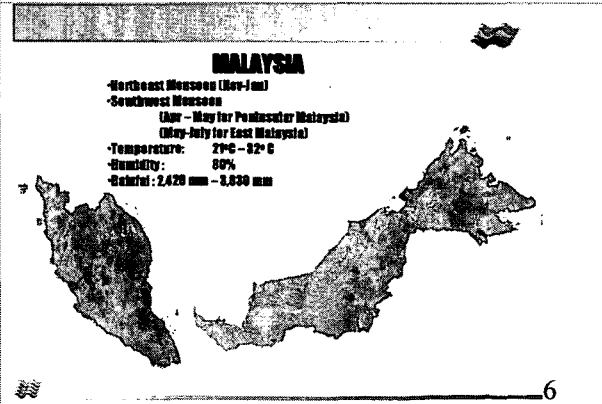
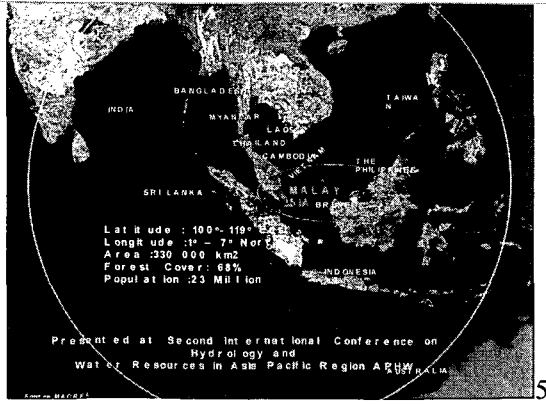
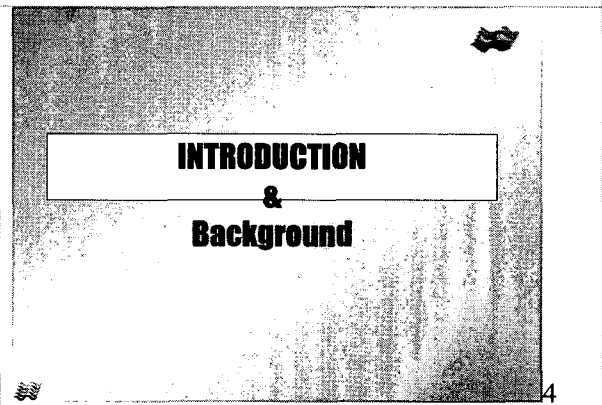
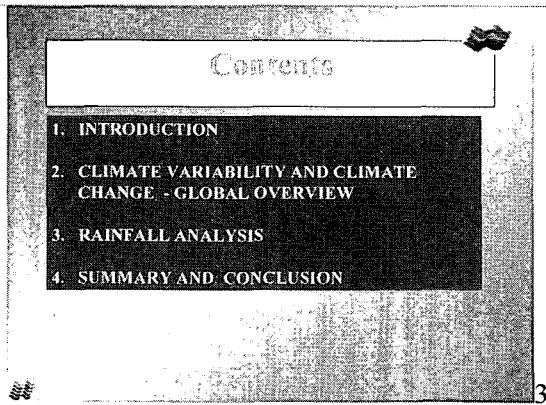
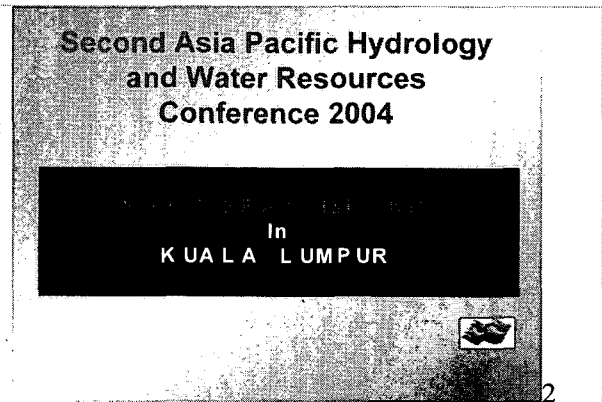
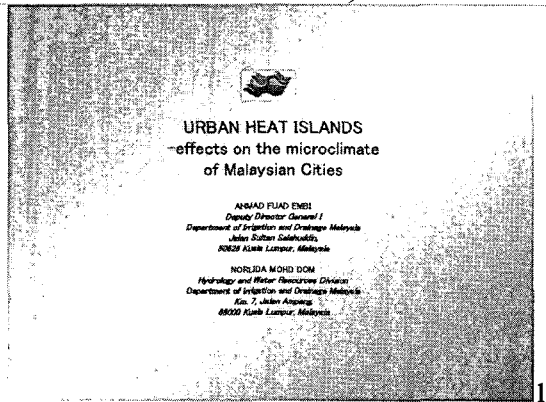
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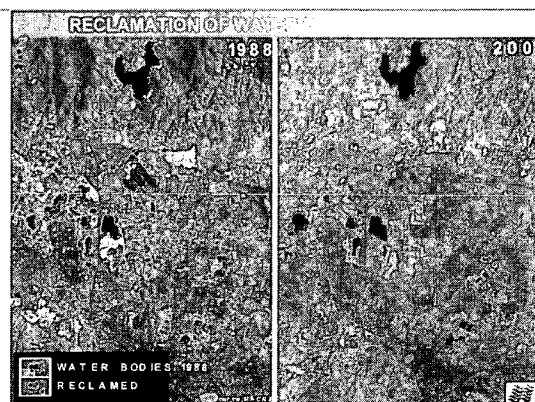
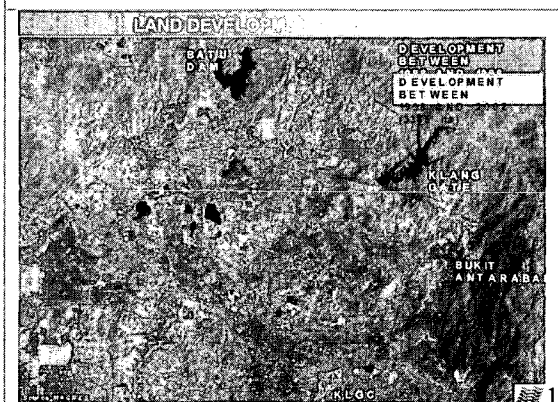
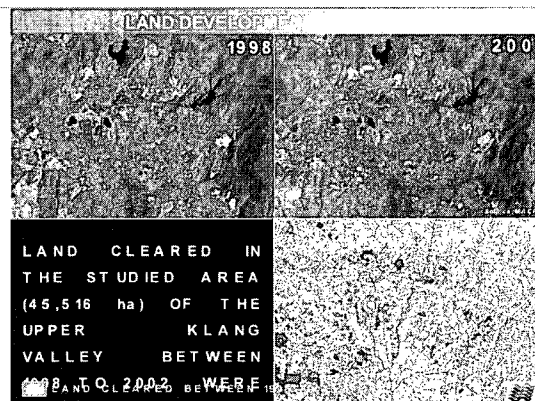
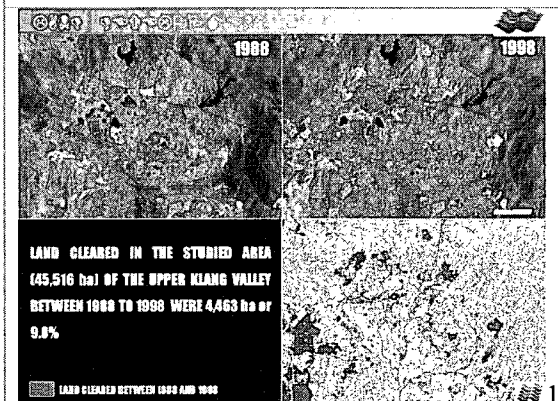
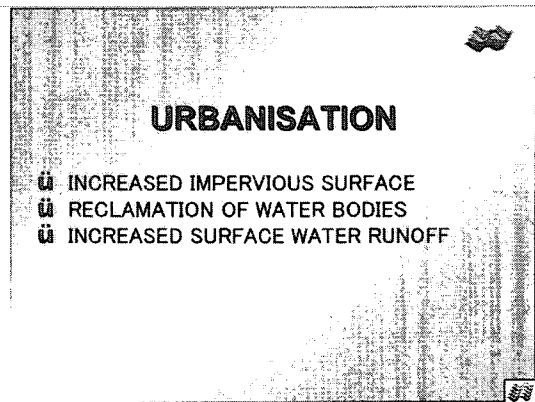
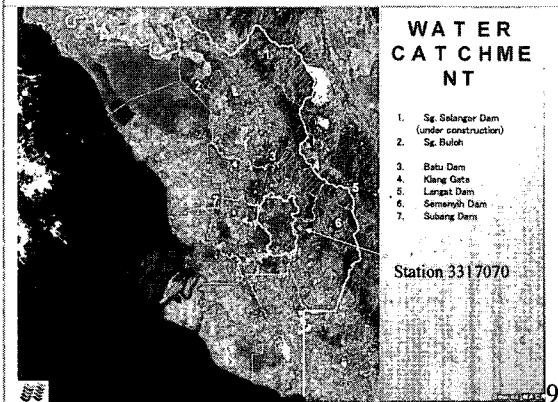
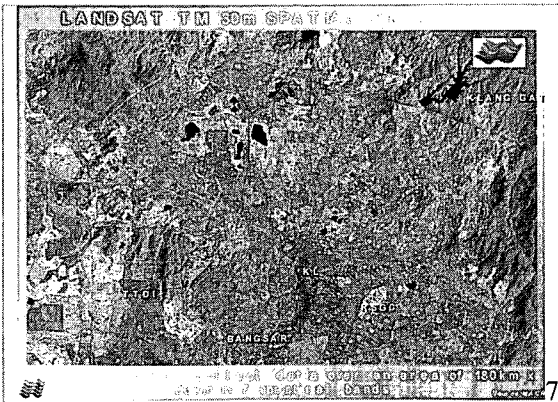
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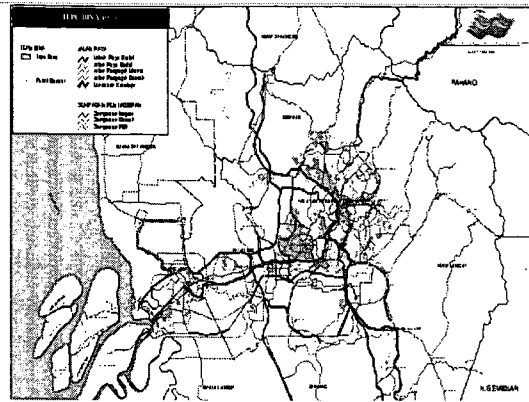
# URBAN HEAT ISLANDS -EFFECTS ON THE MICROCLIMATE OF MALAYSIAN CITIES

Norlida Mohd Dom (Malaysia)

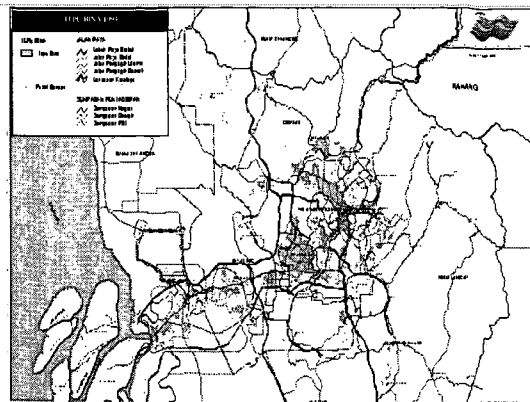




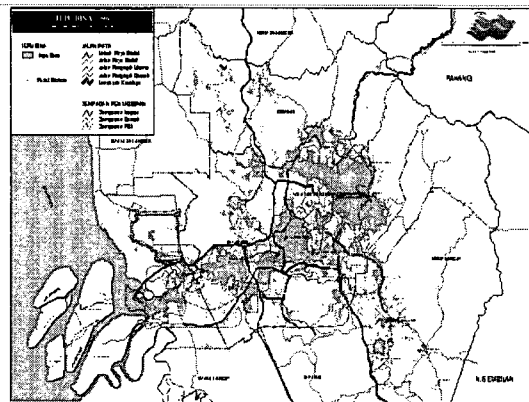




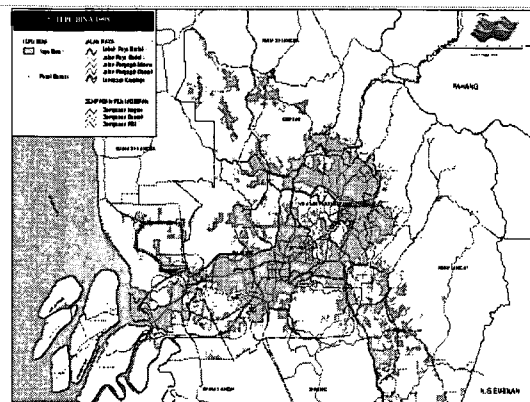
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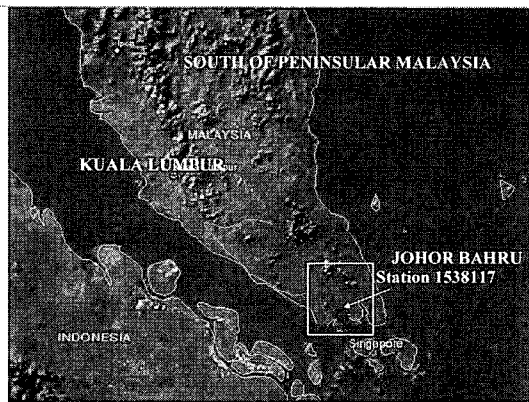
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**"The respiration of humans and animals, above all the fumes of innumerable chimneys, maintain above Paris a rust-colored haze which blocks the sun... it is impossible that (Paris) should not have a notably higher temperature than the surrounding country."**

– Emilien Renou, 1855.

**"... the temperature difference between the countryside (and the city) is about 1o (C)"**

– Emilien Renou, 1868.

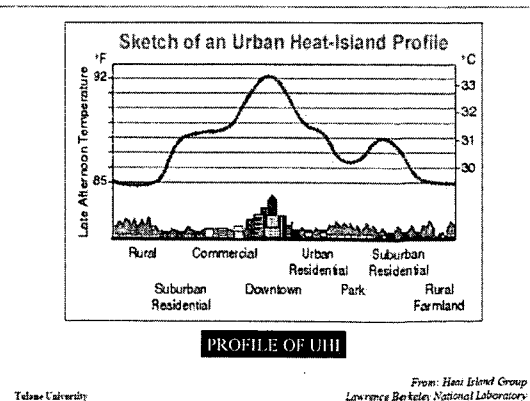
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**Definition of Urban Heat Island (UHI)**

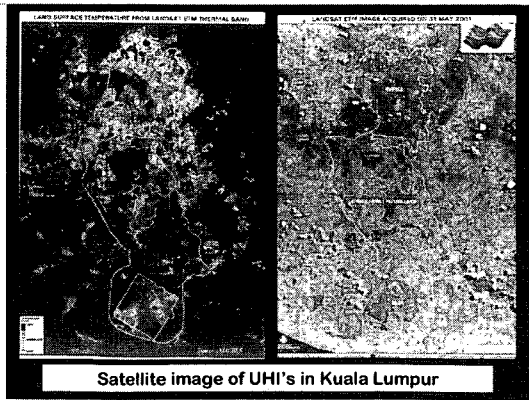
**"An area of higher temperatures in an urban setting compared to the temperatures of the suburban and rural surroundings. It appears as an 'island' in the pattern of isotherms on a surface map."**

**- Glossary of Weather and Climate, Ira Geer, Ed.**

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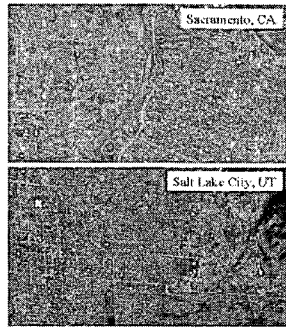
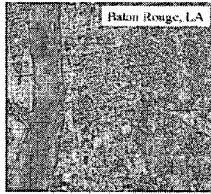
**Tokyo, JAPAN Heat Island Temp Profile**



Images from: J. Voogt, U. Western Ontario and M. Roth, National University of Singapore

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**Remotely-sensed urban heat islands**



Images not to scale  
Tulane University

25

Trees absorb heat through:

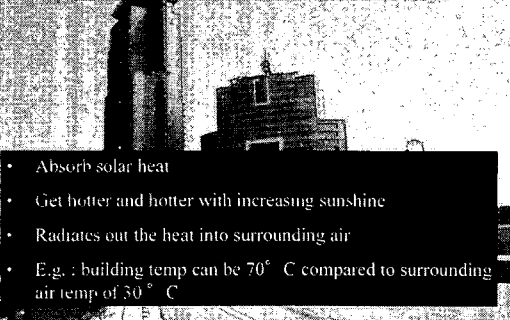
- i. Photosynthesis
  - leaves use solar energy to make plant food
  - i.e. plant temperature does not rise
- ii. Transpiration
  - water absorbed by roots, evaporates from leaves
  - absorbs surrounding heat energy

Therefore, plants cool the surrounding area

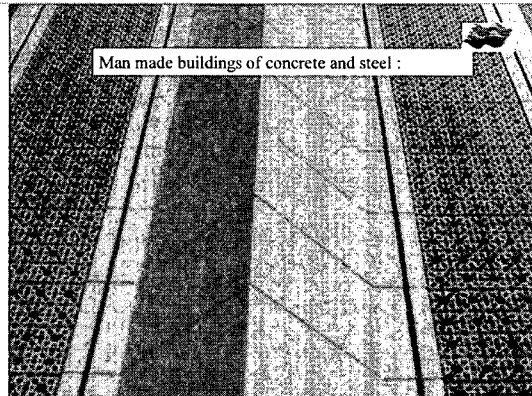
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But,...

Man made buildings of concrete and steel :



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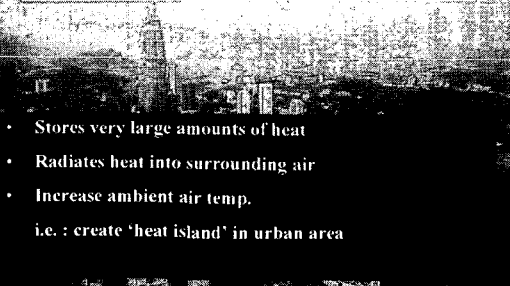
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Man made buildings of concrete and steel :

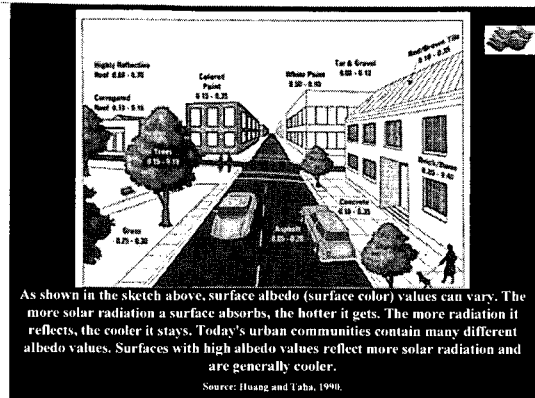


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Concentration of buildings:



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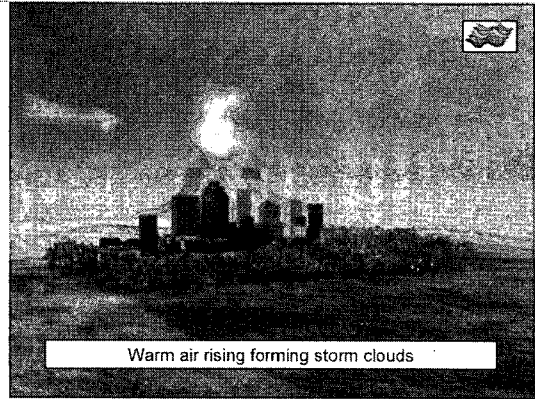


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### Effects of UHI :

- Large power consumption to cool down buildings
- Increase in ozone and chemical reactions causing smog and air pollution (when air temps rise)
- Hot day time temps in city > can be 10° C above rural temps
- Warm nights in city area – due to large latent heat energy stored during day time
- Increase in intensity and frequency of storm events (statistically proven for KL city)
  - resulting in increase of flood events

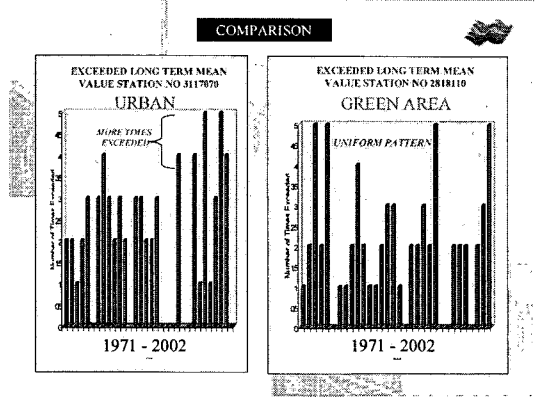
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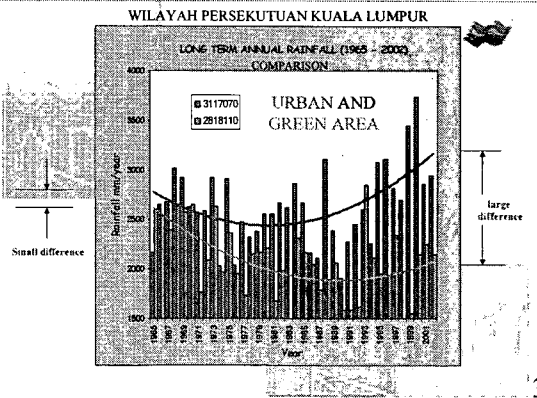
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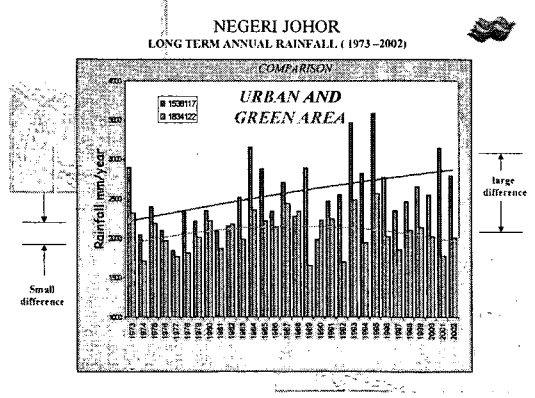
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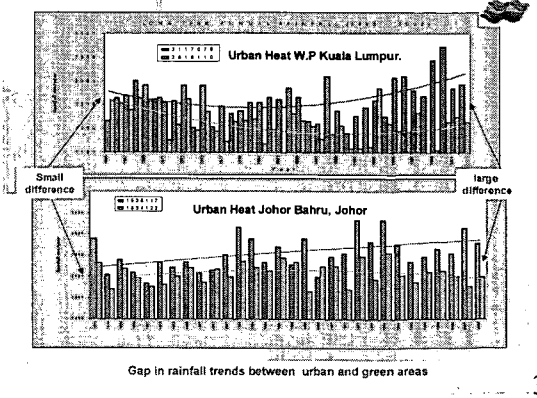
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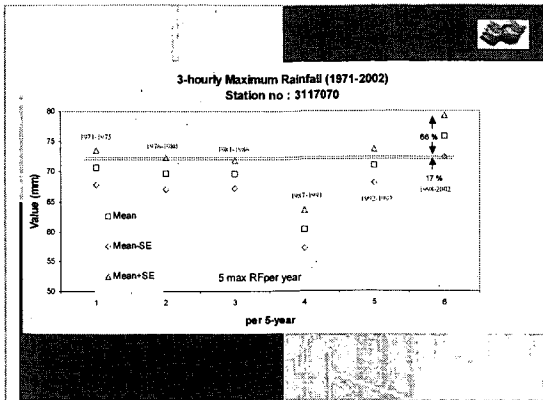
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What can we do about UHI ?

- Follow guidelines well established for US cities
- Identify UHI zones and institute remedial measures
- Increase awareness among city planners, building owners, Govt Regulators

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What can we do about UHI ?

- Get roof tile manufacturers to comply to US specs for high albedo (reflectivity) tiles
- Buildings should be light colour, roof tiles light coloured (low heat absorption)

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What can we do about UHI ?

- Roads, car parks (black because of tar) which absorb maximum heat should comply to >50% shade i.e. trees

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What can we do about UHI ?

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What can we do about UHI ?

- Similarly for road dividers and curbs - put in greenery

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What can we do about UHI ?

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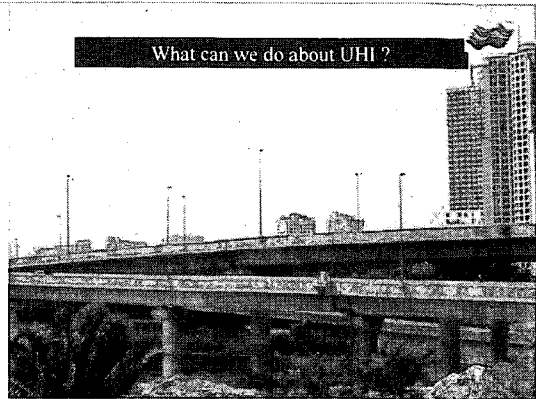
What can we do about UHI ?

46



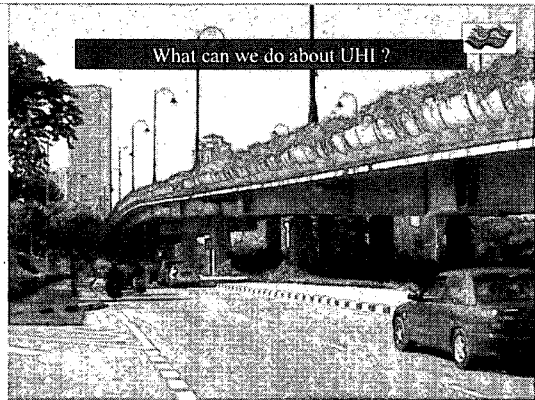
What can we do about UHI ?

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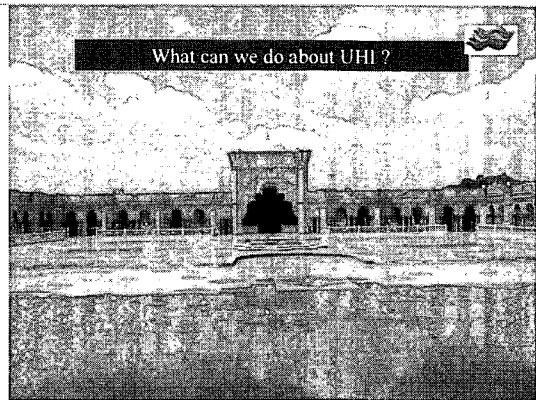
What can we do about UHI ?

48



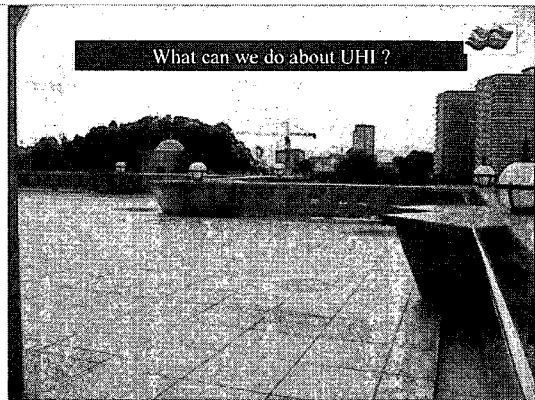
What can we do about UHI ?

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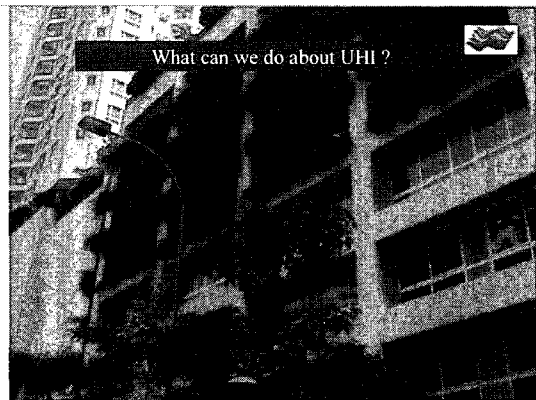
What can we do about UHI ?

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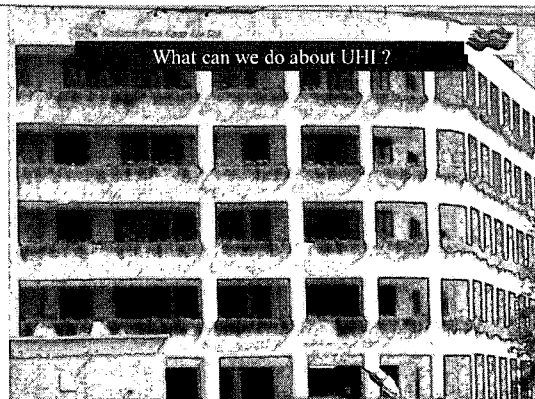
What can we do about UHI ?

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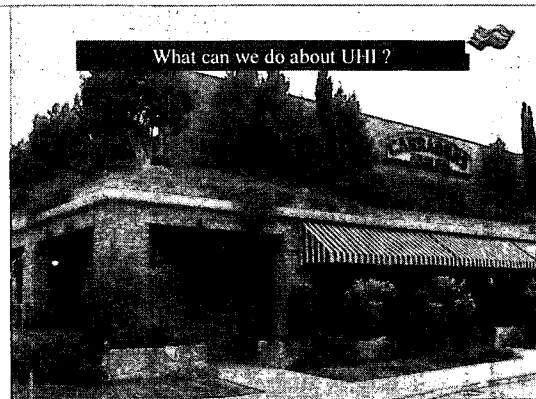
What can we do about UHI ?

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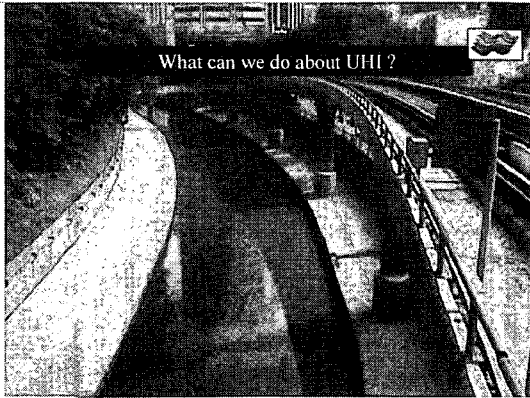
What can we do about UHI ?

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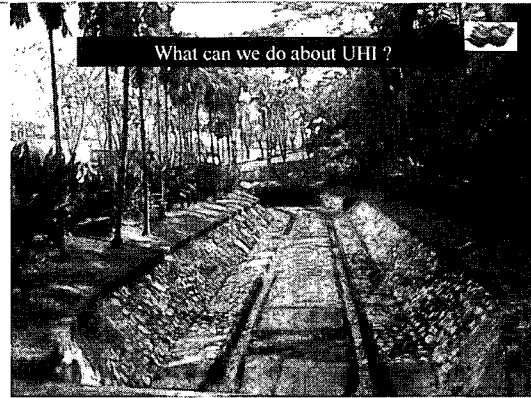


What can we do about UHI ?

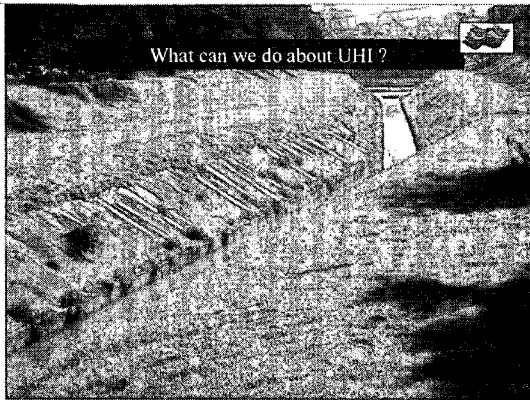
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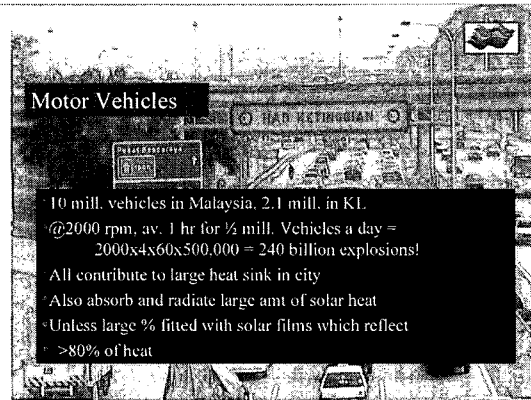
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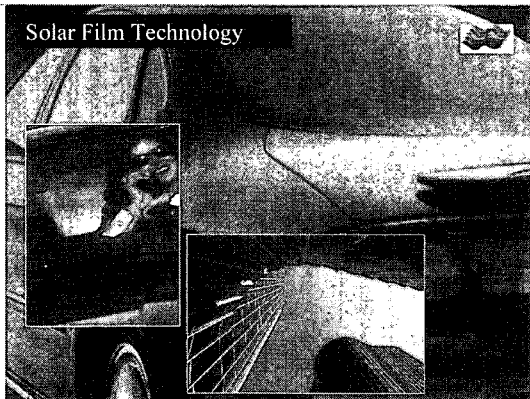
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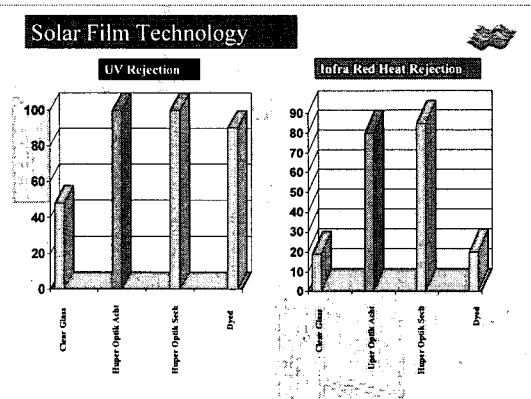
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**Summary & Conclusion**

- Urban Heat Islands (UHIs)
  - Causes changes in Microclimate of Urban Areas (according to preliminary rainfall analysis).
  - Leads to rising trends in rainfall extreme events.
  - Decrease in quality of life of urban areas.
- Awareness of UHIs is necessary.
  - Architects, Town Planners, Building Unit Dev.
- Curative Approach Serious, inadequate.
  - Need Preventive Approach - Stop solar heat from being absorbed.
- Motor Vehicles - New breed of Heat emission in adding to congestion of pollution.
- A Task Force to tackle UHIs appropriate.

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**Thank you**

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# The Challenges in the Water Resources Management in the Philippines

Pacita F. Barba (Philippines)

<p><b>THE CHALLENGES IN WATER RESOURCES MANAGEMENT IN THE PHILIPPINES</b></p> <p>Pacita F. Barba National Water Resources Board 8F, NIA Building, EDSA, Quezon City, the Philippines</p> <p>Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 3-9, 2004, Singapore</p> <p>1</p>	<p><b>PRESENTATION OUTLINE</b></p> <p>I. Available Water Resources II. Water Supply Service Coverage III. Challenges in Water Resources Management IV. Towards Effective Water Resources Management</p> <p>2</p>
<p><b>AVAILABLE WATER RESOURCES</b></p> <p>Average annual rainfall = 2,500 mm</p> <p>Dependable surface water = 126,000 MCM/year</p> <p>Groundwater safe yield = 20,200 MCM/year</p> <p>Total available water resources = 146,200 MCM/year</p> <p>Source: Study on Water Resources Master Plan in the Philippines, JICA, 1998</p> <p>3</p>	<p><b>WATER SUPPLY SERVICE COVERAGE</b></p> <p>In 1995 assessment-</p> <p>Access to safe water drinking: - 69% of the total population of about 73 million</p> <p>Irrigation: - 44% of the potential irrigable area of 3.16 million hectares</p> <p>Source: Study on Water Resources Master Plan in the Philippines, JICA, 1998</p> <p>4</p>
<p><b>The NEED for IWRM</b></p> <p>With the rapid population growth, rising industrialization, increasing environmental degradation and pollution, and the specter of a dwindling resource, the government is now emphasizing the need for integrated water resources management in a comprehensive and holistic manner.</p> <p>5</p>	<p><b>CHALLENGES</b></p> <ol style="list-style-type: none"> <li>1. Weak Institutional Framework</li> <li>2. Disparities Between Water Supply and Demand</li> <li>3. Environmental Degradation/Water Related Disaster</li> <li>4. Partial Access of Water</li> <li>5. Creation of River Basin Organization</li> </ol> <p>6</p>



<p style="text-align: center;"><b>CHALLENGES</b></p> <p>1. Weak Institutional Framework</p> <p>i. <u>Fragmented management</u></p> <ul style="list-style-type: none"> <li>- there are over 30 government agencies and department separately dealing with water supply, irrigation, hydropower, flood control, pollution, watershed management, etc.</li> </ul> <p style="text-align: right;">7</p>	<p style="text-align: center;"><b>CHALLENGES</b></p> <p>1. Weak Institutional Framework</p> <p>ii. <u>Lack of water allocation formula</u></p> <ul style="list-style-type: none"> <li>- the principle of “first in time, priority in right”</li> <li>- insufficient procedure on water allocation</li> <li>- tradable water rights is not allowed by the Code</li> <li>- the necessary cultural, legal and institutional elements for lease or transfer of water rights are not yet in place</li> </ul> <p style="text-align: right;">8</p>
<p style="text-align: center;"><b>CHALLENGES</b></p> <p>1. Weak Institutional Framework</p> <p>iii. <u>Weak water use regulation and enforcement</u></p> <ul style="list-style-type: none"> <li>- lack of manpower</li> <li>- budgetary constraints</li> <li>- no “enforcement power”</li> </ul> <p style="text-align: right;">9</p>	<p style="text-align: center;"><b>CHALLENGES</b></p> <p>1. Weak Institutional Framework</p> <p>iv. <u>Outdated frameworks plans and research</u></p> <ul style="list-style-type: none"> <li>- updating of the frameworks plans</li> <li>- very little effort is directed to the commissioning of similar studies and research.</li> </ul> <p style="text-align: right;">10</p>
<p style="text-align: center;"><b>CHALLENGES</b></p> <p>1. Weak Institutional Framework</p> <p>v. <u>Economic pricing</u></p> <ul style="list-style-type: none"> <li>- does not reflect the realities of scarcity or abundance of water</li> <li>- has minimal attention on economic value of water</li> <li>- does not allocate the scarce resource to the most productive users</li> <li>- does not provide economic incentive for efficient use and conservation of water.</li> </ul> <p style="text-align: right;">11</p>	<p style="text-align: center;"><b>CHALLENGES</b></p> <p>2. Disparities Between Water Supply and Demand</p> <p>i. <u>Limited water resources and their spatial and their spatial distribution</u></p> <ul style="list-style-type: none"> <li>- the distribution of these resources varies widely in time and place</li> <li>- climate change and extreme events</li> </ul> <p style="text-align: right;">12</p>
<p style="text-align: center;"><b>CHALLENGES</b></p> <p>2. Disparities Between Water Supply and Demand</p> <p>ii. <u>Inefficient water use</u></p> <ul style="list-style-type: none"> <li>- water supply projects are inadequately managed,</li> <li>- tremendous waste of water in distribution lines, irrigation canals and at homes.</li> <li>- absence of regulations, economic incentives and institutional arrangements needed to promote water conservation and rational use of water</li> </ul> <p style="text-align: right;">13</p>	<p style="text-align: center;"><b>CHALLENGES</b></p> <p>2. Disparities Between Water Supply and Demand</p> <p>iii. <u>Lack of data</u></p> <ul style="list-style-type: none"> <li>- observation stations for meteorological, hydrological, geological and water quality monitoring are not sufficient</li> <li>- data are being collected and processed by various concerned agencies and kept in their independent database.</li> </ul> <p style="text-align: right;">14</p>

**CHALLENGES**

3. Environmental Degradation/Water -Related Disasters

i. Watershed degradation

Most of the watershed in the Philippines are in critical condition as manifested from recent and recurring calamities such as flashfloods in Southern Leyte and Northern Mindanao and greater frequency of El Nino in Luzon that reduces the water levels in dams. The man's activities in the watersheds had caused erosion and siltation problems in the country's rivers.

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**CHALLENGES**

3. Environmental Degradation/Water -Related Disasters

ii. Poor water quality

The water quality in the country has been impaired severely owing to population growth and misuse of water and land. Domestic sewage contribute about 52% of the population load, while industry contributes the remaining 48%.

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**CHALLENGES**

3. Environmental Degradation/Water -Related Disasters

iii. Indiscriminate groundwater abstraction

- salt intrusion were noticeable in Metro Manila and Cavite in Region IV, Iloilo in Region VI and Cebu in Region VII due to indiscriminate groundwater extraction

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**CHALLENGES**

4. Partial Access of Water

- public participation
- decentralization
- role of women in water sector

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**CHALLENGES**

5. Creation of River Basin Organization

- insufficient funding support
- lack of adequate trained staff
- lack of political will to exercise their broad powers and authority effectively
- insufficient authority to exercise the general mandate of basin authority

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**TOWARD EFFECTIVE WATER RESOURCES MANAGEMENT**

1. The government called for immediate adoption and subsequent implementation of the IWRM
2. The government pushed for the strengthening of a working commitment toward a more wide-ranging course of action to effectively deal with the country's water related issues.
3. The enactment of the Philippine Clean Water Act, the law that provides for a comprehensive water management program to protect the country's water bodies from land based sources of pollution
4. The enactment of the Executive Order No. 123, it is the strengthening of the National Water Resources Board which involves strengthening the planning, monitoring and enforcement capability of the agency and the modification of the Philippine Water Code and its IRR.

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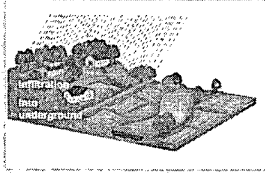
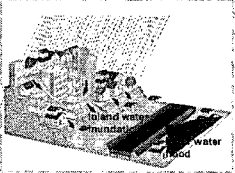
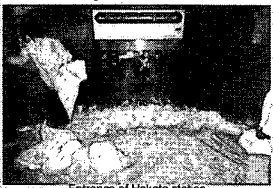
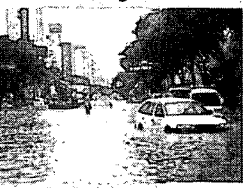
THANK YOU

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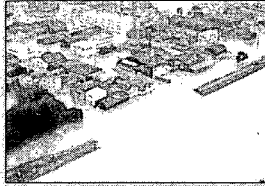
# Recent Flood Control Issues in Japan and Legislation for Preventing Flood Damages in Urban Areas

## Atsushi Hattori (Japan)

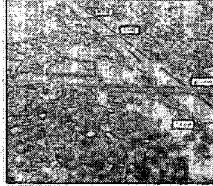
<p style="text-align: center;">Recent Flood Control Issues in Japan and Enactment of a New Law to Prevent Urban Flood Disasters</p> <p style="text-align: center;"><i>Atsushi HATTORI</i></p> <p style="text-align: center;">Senior Researcher of National Institute for Land and Infrastructure Management, Ministry of Land, Infrastructure, and Transport, JAPAN</p> <p style="text-align: right;">1</p>	<p><b>Introduction</b></p> <ul style="list-style-type: none"> <li>In recent years, inundation damage has been increasing in urban areas.</li> </ul> <p>To address such circumstances, "Designated Urban River Inundation Prevention Act" was enacted in June 2003, and has been enforced since May 2004.</p> <ul style="list-style-type: none"> <li><b>Presentation Overview</b> <ol style="list-style-type: none"> <li>Outline of Recent Flood Disasters and Flood Control Measures in Japan</li> <li>Characteristics and Issues of Recent Flood Disasters in Japan</li> <li>Essential Points of the New Law "Designated Urban River Inundation Prevention Act"</li> </ol> </li> </ul> <p style="text-align: right;">2</p>										
<p>1. Outline of Recent Flood Disasters and Flood Control Measures in Japan</p> <p style="text-align: right;">3</p>	<p><b>Major Flood Disasters in Two Decades since 1965</b></p> <ul style="list-style-type: none"> <li>Rapid urbanization accelerated by the high economic growth impaired water retention and retarding functions of river basins.</li> <li>Increasing flood runoff and peak discharge imposed further flood hazard risk.</li> <li>Concentration of population and assets due to urbanization implied a larger risk in a disaster.</li> </ul> <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: right;">4</p>										
<p><b>Flood Control Measures in two decades since 1965 (Comprehensive Flood Control Measures)</b></p> <div style="display: flex;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); border: 1px solid black; padding: 2px;">             Comprehensive Flood Control Measures         </div> <div style="margin-left: 10px;"> <table border="1" style="width: 100%;"> <tr> <td style="width: 20%;"><b>Structural Measures</b></td> <td> <ul style="list-style-type: none"> <li>Channel improvement</li> <li>Flood retention basin construction</li> </ul> </td> </tr> <tr> <td><b>Non-structural Measures</b></td> <td> <ul style="list-style-type: none"> <li>Non-developed area conservation</li> <li>Retention and infiltration facility construction</li> </ul> </td> </tr> <tr> <td><b>Preventive Measures</b></td> <td> <ul style="list-style-type: none"> <li>Grassland and non-developed area conservation</li> <li>Landfill control</li> </ul> </td> </tr> <tr> <td><b>Emergency Measures</b></td> <td> <ul style="list-style-type: none"> <li>Drainage facility improvement</li> <li>Retention facility construction</li> </ul> </td> </tr> <tr> <td><b>Post-disaster Measures</b></td> <td> <ul style="list-style-type: none"> <li>Warning/evacuation system</li> <li>Flood prevention activities at community-level</li> <li>Flood hazard map</li> <li>Proper land use and flood proof measure</li> <li>Flood insurance</li> </ul> </td> </tr> </table> </div> </div> <p style="text-align: right;">5</p>	<b>Structural Measures</b>	<ul style="list-style-type: none"> <li>Channel improvement</li> <li>Flood retention basin construction</li> </ul>	<b>Non-structural Measures</b>	<ul style="list-style-type: none"> <li>Non-developed area conservation</li> <li>Retention and infiltration facility construction</li> </ul>	<b>Preventive Measures</b>	<ul style="list-style-type: none"> <li>Grassland and non-developed area conservation</li> <li>Landfill control</li> </ul>	<b>Emergency Measures</b>	<ul style="list-style-type: none"> <li>Drainage facility improvement</li> <li>Retention facility construction</li> </ul>	<b>Post-disaster Measures</b>	<ul style="list-style-type: none"> <li>Warning/evacuation system</li> <li>Flood prevention activities at community-level</li> <li>Flood hazard map</li> <li>Proper land use and flood proof measure</li> <li>Flood insurance</li> </ul>	<p><b>Major Disasters From 1985 to Present</b> <b>Fukuoka Flood Disaster (1999)</b></p> <ul style="list-style-type: none"> <li>Heavy rain with 77 mm of maximum precipitation per hour hit around Fukuoka-shi</li> <li>It caused overflow of the Mikasa river that runs through Fukuoka-shi.</li> <li>Underground facilities such as basement of the buildings, underground stations and malls were submerged.</li> </ul> <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: right;">6</p>
<b>Structural Measures</b>	<ul style="list-style-type: none"> <li>Channel improvement</li> <li>Flood retention basin construction</li> </ul>										
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### Major Disasters From 1985 to Present Tokai Flood Disaster (2000)

- Maximum precipitation per hour reached 99 mm.
- The total amount of damage in Aichi pref. run up to 865 billion yen.
- The damage is the second worst of all post-war disasters, and the worst among urban flood disasters.



Levee Breach in Shinikawa



Flooding in Nagoya

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### 2. Characteristics and Issues of Recent Flood Disasters in Japan

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### Characteristics of Recent Flood Disasters

#### 1) Extensive Damage in Urban Areas

→ Concentration of Population and Assets due to Urbanization

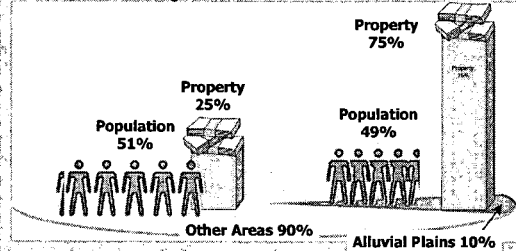
#### 2) Increase of Runoff and Peak Flood Discharge

→ Degradation of Storm Water Retention/Infiltration Function  
→ Lack of Coordination with the Sewage System

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### Concentration of Population and Assets due to Urbanization

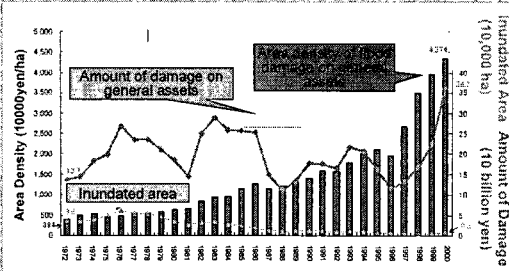
- River flooding in urban areas.
- Extensive damage on concentrated assets in urban areas.



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### Concentration of Population and Assets due to Urbanization

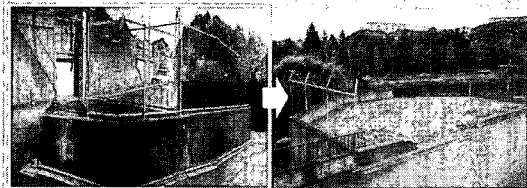
- Increasing amount of damage per inundated area



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### Degradation of storm water Retention / Infiltration function

- Storm water detention ponds were filled up due to lack of the scheme of preservation



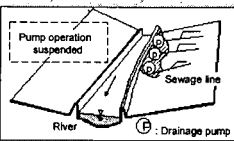
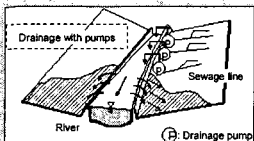
Original storm water detention pond (approx. 500m³ capacity)

Overview after landfill

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### Lack of coordination with the sewage system

- In case of flooding in low-lying areas, excess water is discharged by drainage pumps such as those of the sewage system.
- The pump operation mitigates inland flood.
- River flood may be caused by increased discharge.
- Restricted pump operation may aggravate inland flood damage around the pump station.



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### 3. Essential Points of the New Law "Designated Urban River Inundation Prevention Act"

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## Objectives

- To conduct the following three measures for urban basins where severe inundation has occurred or is likely to occur and where urbanization precludes the use of inundation mitigation measures such as channel improvement etc.

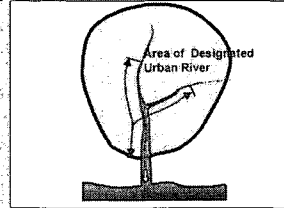
1. Designation of urban river and urban river basin
2. Formulation of river basin inundation prevention plan for comprehensive inundation prevention measures
3. Other required practices such as installation of storm water retention and infiltration facilities by river administrators etc.

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## (1) Designation of Urban River and Urban River Basin

### ■ Designation of Urban River

- ① The River runs through urban areas
- ② Severe inundation damage has occurred or is likely to occur in basins
- ③ Urbanization precludes the use of conventional inundation mitigation measures such as channel improvement, flood control dams and retarding basins.

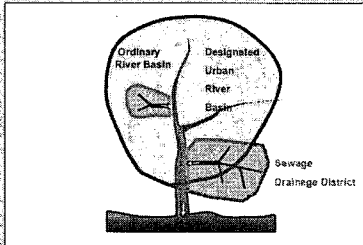


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## (1) Designation of Urban River and Urban River Basin

### ■ Designation of Urban River Basin

A sewage drainage district outside the designated river basin shall also be included if discharge from the district flows into the designated river.



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## (2) Formulation of River Basin Inundation Prevention Plan

### ■ Planner

River administrator, Sewage administrator, Disaster prevention authority

### ■ Planning Items

1. Basic policy of inundation prevention
2. Targeting rainfall for preventing urban flood or urban inundation
3. Improvement of designated urban river and maintenance of storm water retention /infiltration facility and sewage system by river administrator in designated urban basin
4. Storm water retention and infiltration implemented by local authorities
5. Practice to prevent extensive damage in case of inundation
6. Operation control of drainage pump facilities

### ■ Implementation

It is stipulated that administrative bodies (planners) shall make efforts towards the plan enforcement, and that citizens and business owners in the designated basin shall offer support to them.

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## (3) Regulations to Rainfall Flow Limit in Designated Urban River Basins

Permission system for acts that may hamper storm water infiltration etc.

- Acts that may hamper storm water infiltration needs a permission from prefectural governor
- Installation of storm water retention/infiltration function in accordance with technical requirements is required.
- Acts that may hamper functions of storm water retention and infiltration facilities needs a permission from prefectural governor

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## (3) Regulations to Rainfall Flow Limit in Designated Urban River Basins

Notification of acts regarding large storm water detention pond

- Prefectural governor shall designate a storm water detention pond of 100 m<sup>3</sup> or over as a preserved reservoir
- Acts that may prevent functions of the preserved reservoir are required to notify the governor
- Required measures are suggested and recommended by the prefectural governor

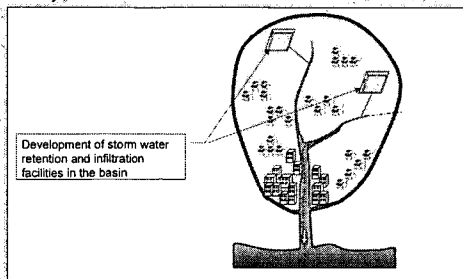
Management agreement on the preserved reservoir

- Local authorities may supervise the preserved reservoir if there is an agreement with the owner
- In this case, the agreement is effective to the grantee as well

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## (4) Measures Based on River Basin Inundation Prevention Plan

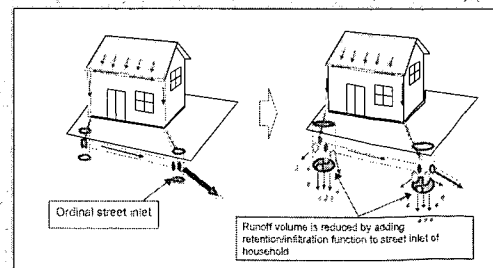
- Storm water retention and infiltration facilities controlled by river administrators



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## (4) Measures Based on River Basin Inundation Prevention Plan

- Special case regarding technical requirements of drainage facilities



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## Conclusion

- This presentation provided characteristics and issues of the urban flood disaster, and an illustration of the newly established law as a countermeasure against the recent urban flood disaster.
- The new law has been enforced since May 2004, and it may take some years until significant outcome is achieved in the situation of an actual disaster. It is sincerely hoped that this law may be able to contribute to resolving issues of urban flood disasters.

# The Revision of Water Law of P.R.C. and the Efforts for Remediating the Dry-up Problems of Yellow River

## Xiong Xiangyang (China)

Revising of Water Law of P.R.C  
And  
the Effort for Remediating the Dry-up Problems of Yellow River



Xiong Xiangyang

### 1. The First Water law

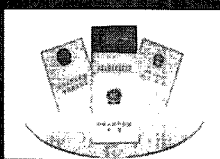
#### 1.1 The history of water legislation

- China has long history on making water laws to manage water affairs. In Han Dynasty (206 B.C.—25 A.D.) and Tang Dynasty (618 A.D.—907 A.D.), the government issued the water decrees. After that time, every dynasty issued some regulations on water management.
- In the early 30s of twenty century, the center government had issued some regulations on water project management.
- In 1984, China issued the Law on Prevention and Control of Water Pollution.
- On January 21, 1988, the first Water Law was issued.

### 1. The First Water law

#### 1.1 The history of water legislation

To 2003, in water management, China has

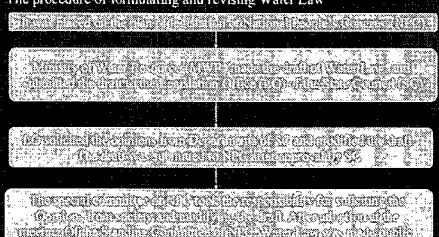


- 4 laws
- 19 administrative regulations
- 90 Ministerial Rules (made by Departments of the State Council)
- About hundred provincial regulations (made by Provincial People's Congresses & their respective Standing Committee)
- About 200 Provincial governmental Rules (made by the provincial governments)

### 1. The First Water law

#### 1.2 Formulation of the First Water law

The procedure of formulating and revising Water Law



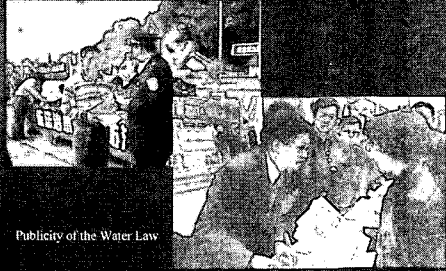
### 1. The First Water law

#### 1.3 Main Contents of the First Water Law

The main systems set by Water Law are:


- System of water plan
- System of water allocation
- System of licensing for water-taking
- System of compensation for use of water
- System of approval for construction in river
- System of protecting groundwater
- System of consulting water dispute
- System that administrative heads assume overall responsibilities for flood control

### 1. The First Water law



Publicity of the Water Law






## 1. The First Water law

### 1.4 The achievements of carrying out Water Law

- More and more people have realized the importance of regulating water affairs.
- A system of regulation has been set. Every affair concerning water can be regulated by these regulations and laws.
- The system of unified management and supervision is setting up step by step. Policies concerning water management have been partly unified.
- The order of development and utilization of water resources is getting better.



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## 2. Revision of Water Law

Since 90's, the situations of society and economy and water resources have got great changes. Revising old Water Law became an urgent task. In 1994, the revision of Water Law was placed on the plan of legislation of 8th National People's Congress. In 2002, the new Water Law was made public and effective. In new Water Law, some new administrative systems have been added and some principles have been replaced by more rational principles.


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## 2. Revision of Water Law

Deliberation of New Water Law in the Meeting of the Standing committee of the Ninth National People's Congress

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## 2. Revision of Water Law

### 2.1 The necessity of revising water law

In 90's, the issues of water shortage, flood disaster and water environment degradation were not solved. In some areas, these issues became more and more serious. (Water shortage has become one of the major constraints on stable development of national economy, especially the sustainable development of agriculture. Nearly half of the river courses suffered from various degrees of pollution. Flood disaster is still the troublemaker of the Chinese nation.) Meanwhile, China was facing the greater and greater challenges caused by population growth, social and economic development.

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## 2. Revision of Water Law

### 2.3 The main parts revised

Comparing the old Water Law, the main parts revised are followed:

- **Emphasizing the unified management of water resources.**  
The system of unified administration on water resources in association with administration at various levels and by various departments has been replaced by that the administrative departments for water resources of governments are responsible for unified management and supervision over the water resources.
- **Stressing the proper allocation of water resources.**  
The water resources in every river basin should be allocated according to the principle of amount control. Every region will get a amount of using water, and the remains of water resources should maintain a proper flow of rivers and keep the lakes, reservoirs and groundwater at a proper water level. The local governments must control the needs to water resources and distribute the water to all the user under the amount allocated.

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## 2. Revision of Water Law

### 2.3 The main parts revised

- **Strengthening the measures of macro-management.**  
The planning, allocating, dispatching and supervising of water resources should be undertaken with the river basin as basic unit.  
The State shall formulate national water resources strategic plan.  
The system of river basin management combining with management of administrative region should be applied. The river basin authorities will play more important roles in water resources management especially in allocation of water resources, supervision of drawing and using water resources, management of plan, dispatch of surface water and groundwater.
- **Emphasizing the harmony of water resources and population, development of economy and ecological environment.**  
The system of dividing and managing water function zone, the system of establishing conservation districts for drinking water source, the system of total discharge of various pollutants, the system of managing sewage discharge outlet, the system of defining the prohibited area and restricted area of groundwater exploitation and the system of prohibiting the reclamation of river shall be strictly applied nationwide.

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## 2. Revision of Water Law

### 2.3 The main parts revised

- **Enhancing the water-saving.**  
The State applies the system for the use of water under which control over the total volume is combined with control over the quotas.  
The water-saving facilities shall be designed, constructed and put into operation simultaneously with the principal part of project.  
The State gradually eliminates the techniques, equipment and products that are outdated and are of high water-consumption.  
Some policies will be made to encourage the use of recycled water.  
Two-step water pricing mechanism will be taken. Under the quotas, the price will cover the cost and profit. Above the quotas, the price will increase with the amount.
- **Strengthening the management of river and water project.**  
The State applies the licensing system for sand quarrying in river courses.  
The scope of management and protection of the waterworks shall be defined.

13

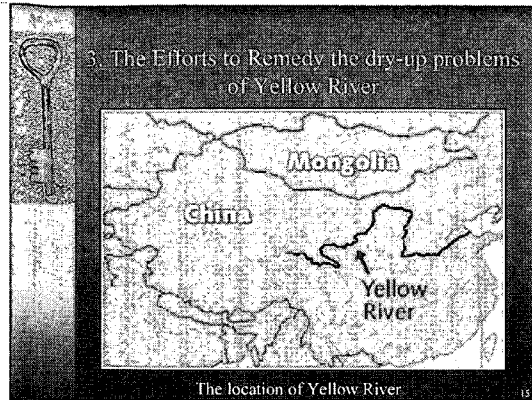


## 2. Revision of Water Law

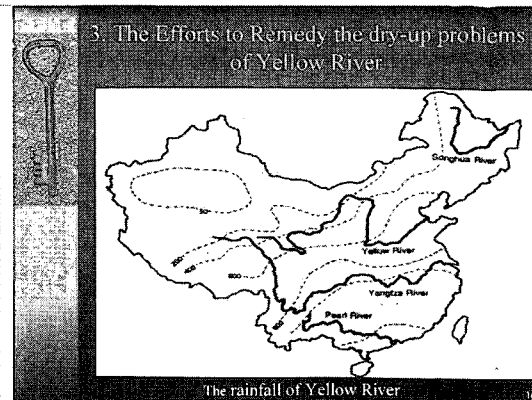
### 2.4 Implementation of New Water Law

After the new Water Law was issued, MWR speeded up formulating the regulations and rules in order to implement the new Water Law. The provincial People's Congresses also began to revise the local Water Regulations. Some regions have already issued the new water regulations.

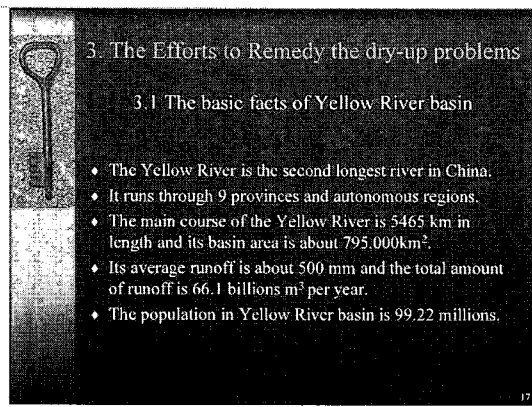
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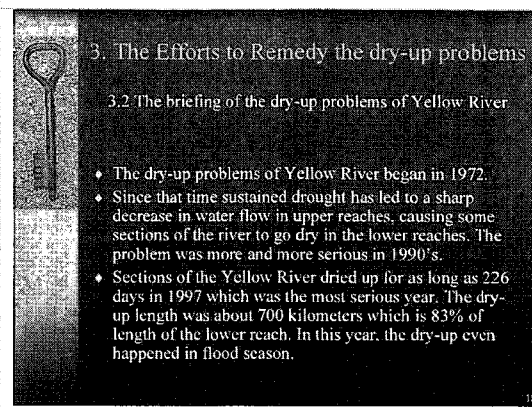
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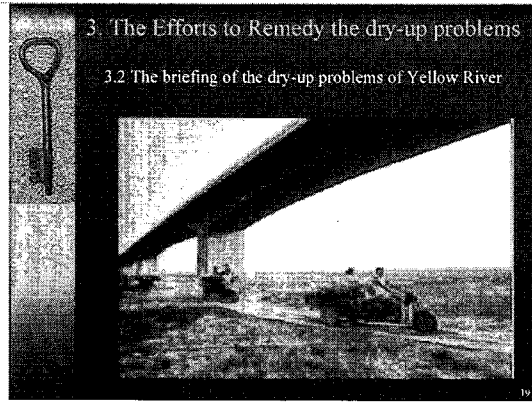
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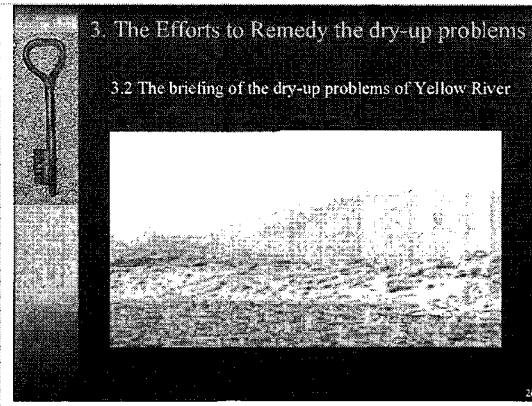
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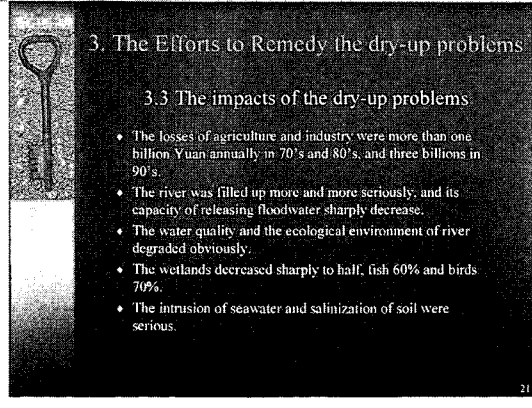
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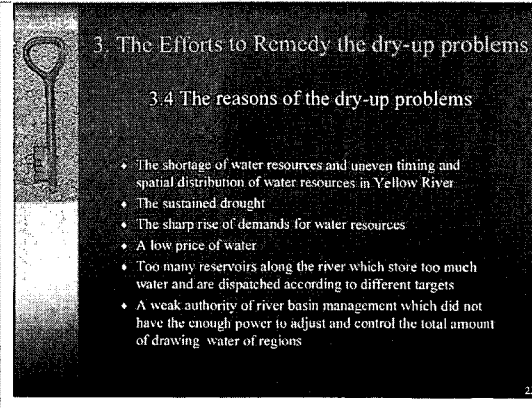
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22

### 3. The Efforts to Remedy the dry-up problems

#### 3.5 The measures to remedy the dry-up problems

- Formulating the plan of water allocation of river basin. This plan defined region's total amount of drawing water from Yellow River and the proper flow of river. In 1997, the plan was approved by the State Council.
- Formulating the Administrative Regulation of Water Dispatch in Yellow River. The Regulation that endows the authority of Yellow River Management with power to adjust and control the regions' amount of drawing water and sets up the procedure of the water amount management was issued in 1998.
- Setting up the special institute taking charge of adjusting and controlling the regions' amount of drawing water.
- Building the water project aiming at adjusting water amount and controlling floods.
- Rising the water price. The price for irrigation at the lower reach of Yellow River rise to twice of the original and for industry 11 times of the original.
- Publicizing the policies of water saving.

23

### 3. The Efforts to Remedy the dry-up problems

#### 3.5 The measures to solve the dry-up problems

The procedure of water amount management (In ordinary year)

24

### 3. The Efforts to Remedy the dry-up problems

#### 3.5 The measures to solve the dry-up problems

The procedure of water amount management (In serious dry season)

- AYRW submits the report of entering the emergency period of water dispatch to MWR. MWR checks and submits it to the State Council for approving in 10 days.
- After the report is approved, the National office of Flood Control and AYRW take charge of dispatching the water projects and runoff of Yellow River.
- Regions report the amounts of drawing water day by day to AYRW.
- The regional plans of drawing and using water will be made month by month and they can be adjusted every 10 days.

25

### 3. The Efforts to Remedy the dry-up problems

#### 3.6 The effect of taking the measures

- Since the Administrative Regulation of water dispatch was implemented in 1999, the situation of Yellow River has been getting better. In 1999, the dry period of the lower reach was shortened by 8 days. From 2000 to 2003, Yellow River did not go dry. In 2001 and 2003, Yellow River even supplied water to solve the problem of water shortage in Tianjin City which is out of Yellow River Basin.
- The ecological environment of Yellow River has been gradually recovering.
- The essential demands for water in whole basin has been ensured.
- The effect of water-saving is obvious. In Ningxia Autonomous Regions and Inner Mongolia Autonomous Region, the total amount of using water in 2000 decreased 1.27 billions m<sup>3</sup>.

26

### 3. The Efforts to Remedy the dry-up problems

#### 3.7 The further measures to improve the management of Yellow river basin

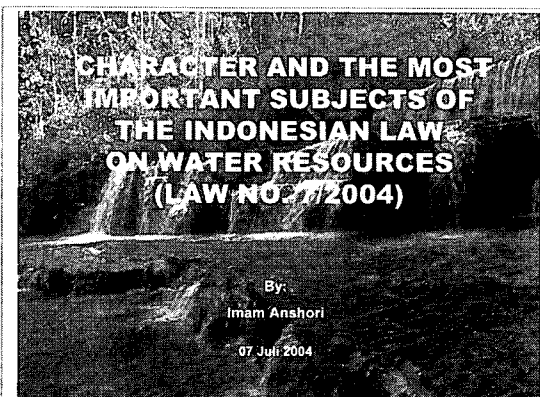
- Formulating the Yellow River Law. The research of this law is on the way now.
- Strengthening the management of water quality. The regulation of water resources protection in Yellow River has been formulating.
- Improving the administrative systems according to New Water Law.
- Setting up the system of water rights of Yellow River step by step. Some regions are launching the trade of water rights as the pioneers.
- Setting up gradually the new system of river basin management. In the new system, the regions and users will play more important roles in making policies on river basin management.

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# CHARACTER AND THE MOST IMPORTANT SUBJECTS OF THE INDONESIAN LAW ON WATER RESOURCES

Imam Anshori (Indonesia)



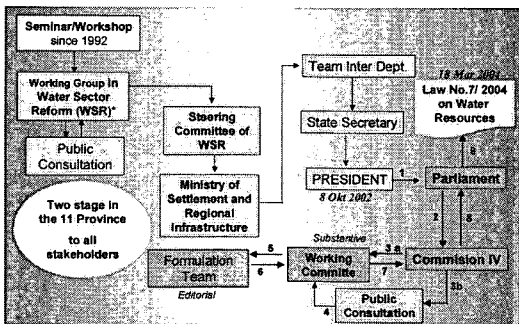
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## Why we need to revise The Existing LAW No. 11/ 1974 ?

1. to anticipate complexity in the development of issues on water resources
2. to put water in harmoniously social, environmental and economic dimensions;
3. to attain integrity in water resources management (WRM);
4. to accommodate the demand for decentralization and regional autonomy;
5. to give better attention to the basic human rights to water;
6. to put the mechanism and process of formulating policies and a more democratic plans of WRM in place .

2

## PROCES TO FORMULATE OF THE NEW LAW ON WATER RESOURCES

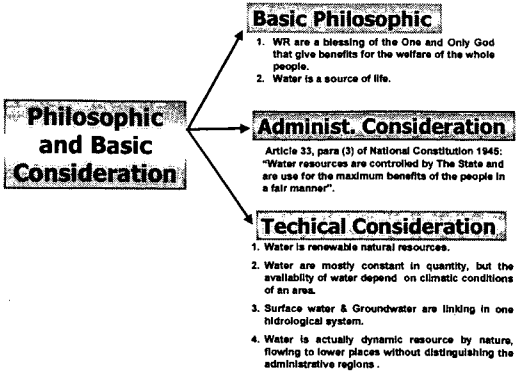


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## CHARACTERISTIC OF THE NEW LAW No.7/ 2004 on WR

1. no longer focused on the construction (development) of WR infrastructures, but on the provision of conditions for sensible, sustainable WRM
2. not only covering the domains of WRM, but also the process of WRM.
3. The law's scope is aimed at integrating WRM in all its aspects → a coherent integral approach is adopted.
4. openness and encourage participation of stakeholders.
5. The law is integrating social function and economic values.

4



5

## Comparison: The Old and The New Law

Law No. 11/ 1974	Law No. 7/ 2004 on WR
Chapt I. GENERAL PROVISIONS Chapt II. FUNCTION Chapt III. MASTERY RIGHT AND AUTHORITY Chapt IV. PLANNING AND DESIGN Chapt V. SUPERVISION Chapt VI. EXERTION Chapt VII. EXPLOITATION AND MAINTENANCE Chapt VIII. CONSERVATION Chapt IX. FINANCING Chapt X. CRIMINAL PENALTIES Chapt XI. TRANSITIONAL PROVISIONS Chapt XII. CONCLUDING PROVISIONS Total = 17 Articles	Ch I. GENERAL PROVISIONS Ch II. AUTHORITY AND RESPONSIBILITY Ch III. WATER RESOURCES CONSERVATION Ch IV. WATER RESOURCES UTILIZATION Ch V. CONTROL OF WATER DESTRUCTIVE POWER Ch VI. PLANNING Ch VII. CONSTRUCTION, OPERATION & MAINTENANCE Ch VIII. WATER RESOURCES INFORMATION SYSTEM Ch IX. EMPOWERMENT AND SUPERVISION Ch X. FINANCING Ch XI. RIGHTS, OBLIGATION AND ROLES OF THE COMMUNITY Ch XII. COORDINATION Ch XIII. SETTLEMENT OF DISPUTES Ch XIV. COMPLAINTS BY THE COMMUNITY AND ORGANIZATIONS Ch XV. INVESTIGATION Ch XVI. CRIMINAL PENALTIES Ch XVII. TRANSITIONAL PROVISIONS Ch XVIII. CONCLUDING PROVISIONS Total = 100 Articles

6

## THE MOST IMPORTANT SUBJECTS

7

### 1. Water Use Right

1. WUR mean the rights are only limited to use and to utilize the amount of water for various purposes that user is allowed to take at any particular time from natural water resources such as river, lake, canal or aquifer.
2. The volume of allocation determined in this respect is not conclusive and must be in compliance with the volume stated in the permit.
3. This law gives more protection to the interests of weak economic groups of the society, by applying the principles of WRM that will ensure the harmony of social, environmental and economic functions.
4. the basic daily needs of individuals and the people's agriculture activities located within an irrigation system will be protected by the Government or the Regional Governments.

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### 2. Institutional Aspects.

1. The authority and responsibilities in the WRM by the Government, the Provincial Governments, and the District/Municipal Governments are arranged in accordance with the situation of the River Basins.
2. The law already provided for the establishment of coordination committees on WRM at different administrative levels. (The National, and The Provincial, and The District/Municipality, and The River Basin).
3. In line with the principles of democracy, the community will not only be given the role in the preparation of WRM policy, but also the role in the process of planning, construction, operation and maintenance, monitoring and supervision of the WRM .

9

### 3. WR Utilization.

1. WR utilization comprises a broad range of activities, i.e.: supply, usage, development and exploitation of water resources.
2. The provision of WR in each river basin shall be done in accordance with the usage arrangements of the WR determined in the bid to serve.
3. The utilization of water resources shall be done by giving priority to the social function by considering the principles of water users to pay for management service fees. This provision does not imply to the water user for basic daily needs and people's agriculture.
4. All other forms of water use are subject to license, except of water use for people's irrigation within the existing irrigation system, no license is therefore required and free of charge.
5. Water supply to serve the human basic needs shall be the top priority in the provision of WR over all other needs. The second priority given to the people's irrigation within existing irrigation system.
6. The order of priorities in the provision of WR for the other uses of water shall be determined in each river basin by the Government or the respective regional governments in accordance with their authorities.

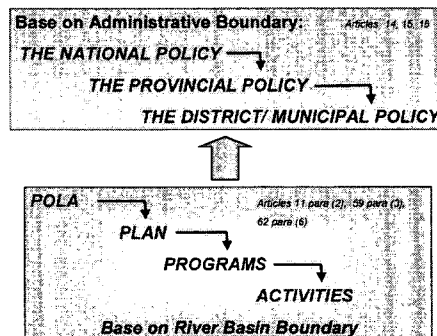
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### 4. WR Conservation.

1. WR conservation shall be conducted through the activities of protection of WR, water preservation, and water quality management & water pollution control base on the WRM scheme determined for each river basin.
2. Water source protection and preservation are meant to protect and conserve water sources and their environment from any destruction or disturbances by natural forces, including draught and man-made activities.
3. Water preservation is meant to maintain the existence and availability of water and water quality, in its functions and benefits.
4. The water quality management shall be done by improving the quality of the water in the water resources.
5. The water pollution control shall be done by preventing the entry of water pollutant into the water body.
6. Every person or enterprise shall not do any activities that will cause the destruction of the water body, impediments in the water preservation activities and/or water pollution.

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### 5. WR Planning Systems



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### 6. Management of Irrigation Systems.

1. The authority and responsibility for the development and O&M of primary and secondary irrigation systems:
  - across provinces shall be within The National Government.
  - across districts/cities shall be within the provincial government;
  - in a single district/city shall be within the concerned district/city government
2. The right and responsibility for the development and O&M of tertiary irrigation systems shall be with the water user associations
3. The development and O&M of primary and secondary irrigation systems shall be arranged with participation of the community; and
4. The water user associations or other parties in accordance with their needs and abilities may do the development and O&M of primary and secondary irrigation systems

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### 7. WR Information Systems.

Water resources information systems have an appropriate place in this new law, such as:

- The information systems consist of the hydrological, hydro-meteorological, hydro-geological conditions, WR policies, infrastructures, technologies, environment, and the socio-economic activities related to the water resources.
- The National Government and the regional governments may set up their technical implementation units to operate water resources information system.
- The National Government and the regional governments as well as the WRM shall in their respective authorities provide water resources information for all parties interested in water resources.

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## 7. WRM Financing.

1. The funding sources for each type of WRM financing may come from:
  - a. the state budget;
  - b. private sector budget; and/or
  - c. revenues of WRM services.
2. The water users for basic daily needs and for people's agriculture shall not be charged WRM fee.
3. The users of water resources other than for the purposes shall be charged the WRM fee.
4. The amount of WRM fee for each type of WR used shall be based on the considerations of the economic abilities of the users' groups and the volume of WR use.

15



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# Water Use in Metro Manila and Metro Cebu

## Cleofin G. Bumatay (Philippines)

<p style="text-align: center;"><b>WATER USE IN METRO MANILA AND METRO CEBU</b></p> <p style="text-align: center;"><b>CLEOFIN G. BUMATAY</b> National Water Resources Board 8F, NIA Building, EDSA, Quezon City Philippines</p> <p style="text-align: center;">Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 5-9, 2004, Singapore</p> <p style="text-align: right;">1</p>	<p style="text-align: center;"><b>WATER USE IN METRO MANILA AND METRO CEBU</b></p> <p><b>Metro Manila</b> is the main and largest city and national capital region of the Philippines</p> <p><b>Metro Cebu</b> is the second largest city in the Philippines and lies at the center of the island of Cebu Province in Region VII</p> <p style="text-align: center;">Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 5-9, 2004, Singapore</p> <p style="text-align: right;">2</p>
<p style="text-align: center;"><b>WATER USE IN METRO MANILA AND METRO CEBU</b></p> <p style="text-align: center;"><b>Institutional Framework</b></p> <p>Metropolitan Waterworks and Sewerage System (MWSS) is responsible for providing domestic and industrial supply in Metro Manila. Its operations was privatized.</p> <p>Metropolitan Cebu Water District (MCWD) is responsible for supplying water to Metro Cebu.</p> <p style="text-align: center;">Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 5-9, 2004, Singapore</p> <p style="text-align: right;">3</p>	<p style="text-align: center;"><b>WATER USE IN METRO MANILA AND METRO CEBU</b></p> <p style="text-align: center;"><b>Service Coverage</b></p> <p>In 2000, MWSS piped water connections is about 67% of Metro Manila's population of about 12 million</p> <p>MCWD serves about 40% of the population of Metro Cebu of about 1.2 million</p> <p style="text-align: center;">Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 5-9, 2004, Singapore</p> <p style="text-align: right;">4</p>
<p style="text-align: center;"><b>WATER USE IN METRO MANILA AND METRO CEBU</b></p> <p style="text-align: center;"><b>Water Supply and Demand</b></p> <p>The estimated water demand of Metro Manila in year 2000 was 3,800 MLD and projected to increase to 8,000 MLD by 2025. At present, the water supply capacity of MWSS water system is 4,000 MLD.</p> <p>On the other hand, the estimated water demand of Metro Cebu was 254 MLD and expected to reach 520 MLD by 2025. MCWD's present water supply capacity is 130 MLD</p> <p style="text-align: center;">Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 5-9, 2004, Singapore</p> <p style="text-align: right;">5</p>	<p style="text-align: center;"><b>WATER USE IN METRO MANILA AND METRO CEBU</b></p> <p style="text-align: center;"><b>Performance Assessment</b></p> <p>The current supply of MWSS is available on average for only 16 hours per day. An average of nearly 60 percent of the water produced by MWSS is non-revenue water, or water that is not billed or unaccounted-for due to illegal connections, leakage, and other reasons.</p> <p>The Metro Cebu Water District supplies water at an average of 18 hours a day. Its rate of non-revenue water is also relatively high at 38 per cent of the water produced.</p> <p style="text-align: center;">Second International Conference on Hydrology and Water Resources in Asia Pacific Region July 5-9, 2004, Singapore</p> <p style="text-align: right;">6</p>



## WATER USE IN METRO MANILA AND METRO CEBU

### Activities for Sustainable Water Supply

#### *Watershed Protection*

To protect the water sources as to quantity and quality, MWSS and MCWD are the forefront in the ecological and environmental issues. Other concerned organizations are coordinated in protecting water sources from contaminating, restricting the development of the watershed areas, and in reforestations. Information campaign was also launched to get the public involvement in the ecological and environmental concerns.

Second International Conference on Hydrology and Water Resources in Asia Pacific Region  
July 6-9, 2004, Singapore

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## WATER USE IN METRO MANILA AND METRO CEBU

### Activities for Sustainable Water Supply

#### *Water Conservation*

The activities on water conservation include: i) improving the systems' efficiency; ii) improving the metering efficiency and monitoring the unauthorized use of water; iii) encouraging the use of saving devices, application of clean technologies and recycling; and iv) conducting intensive public education programmes on water conservation.

Second International Conference on Hydrology and Water Resources in Asia Pacific Region  
July 6-9, 2004, Singapore

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## WATER USE IN METRO MANILA AND METRO CEBU

### Issues in the Water Supply Sector

#### **The major issues are:**

- insufficient system capacity
- competing demands from other uses
- environmental degradation
- outdated and inefficient water distribution system
- rapid growth population
- fragmented and weak development planning
- water pricing

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## WATER USE IN METRO MANILA AND METRO CEBU

### Recommendations

Some of the above issues must be resolved through

- larger public investment in developing new water infrastructure,
- improved efficiency of service delivery and water use,
- high recovery of project costs and economic pricing of water.
- institutional strengthening of water utilities and regulatory agencies,
- greater participation by beneficiaries in project planning and implementation, and
- increased private sector involvement in water supply services would encourage more efficient use of water.

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## WATER USE IN METRO MANILA AND METRO CEBU

# THANK YOU

Second International Conference on Hydrology and Water Resources in Asia Pacific Region

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# Systematic Review of Water Management during Drought in Japan

## Masahiko Murase (Japan)


July 7, 2004  
NILIM Special Session

### Systematic Review of Water Management during Drought in Japan

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**MURASE, Masahiko**  
National Institute for Land and Infrastructure Management,  
Ministry of Land, Infrastructure and Transport (NILIM-MLIT)

### Topics



- Characteristics of Rivers in Japan
- Water Rights
- Drought Conciliation
- 1994 Droughts Experience
- Difficulties in management

### Rivers and Water Uses

Rivers in Japan are characterized by a large difference between maximum and minimum discharges. Since the quantity of water used by humans is by far greater than the minimum discharges, dams are necessary as a means of storing water.

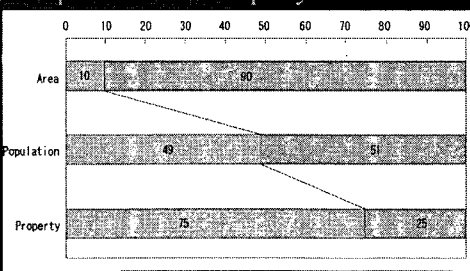
Maximum/minimum discharges and water uses

River	Ratio (Max/Min)
Tone River	1/100
Yoshino River	1/290
Shinano River	1/40
Chikugo River	1/100
Ishikari River	1/30
Kitakami River	1/45
Yodo River	1/30
Tone River	1/60
Tone River	1/180

Discharge scale: 1,000m<sup>3</sup>/s

① The number in each box is the ratio between the maximum and minimum discharges (minimum maximum).  
② Water use (total water use volumes including the volume of water used by sensitive water use data for the 1-die River areas.  
③ Sources: Based on *Streamflow Yearbook Data for 1993* and *River Right Records* (end of FY1993).

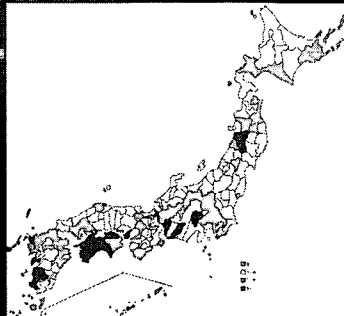
### Population and Property



Category	Other areas (%)	Alluvial plains (areas lower than the flood level) (%)
Area	10	90
Population	49	51
Property	75	25


Concentration of Population and Property on Alluvial Plains

### Vulnerable (droughts)



Annual frequency of drought in the past 16 years (1977-1995)

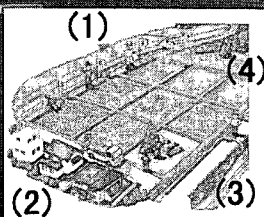
### History of Water Resources Development



- Since long ago, the economy of Japan has been based on agriculture, producing rice as the staple food for the Japanese
- Water resource development in Japan began with the construction of ponds or reservoirs to store water for agriculture as a precaution against droughts.

## History of Water Rights in Japan

- autonomous
  - based on conciliation
- but,
- vested interests

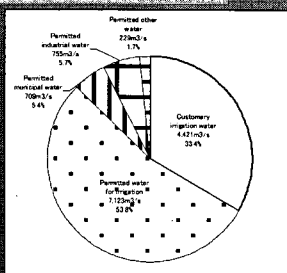


Example. Ban-sui (use water by turn)  
(1) (2) (3) (4) ... based on conciliation

## River Law – water rights

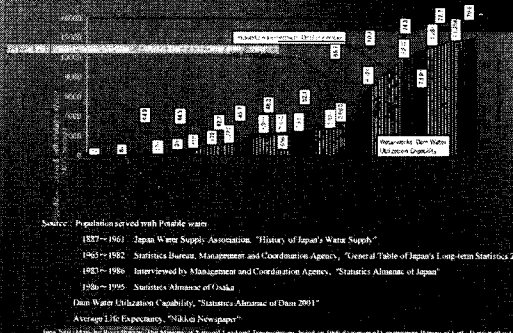
- Modern system - the backdrop of a system of water rights that had already been endorsed as a customary order and especially of vested rights for the exclusive private use of river water in river basins.
- The old River Law established in 1896 ruled that "those intending to use river locations or river water for private purposes should seek the approval of the Department for Administrative Affairs (Article 18) or that those already in possession of customary water rights "should be deemed as having obtained (such) approval" (Article 11 of the Enforcement Ordinance pertaining to the Water Law).
- The 1964 River Law defines the rules applicable to the approval of private river water use (Article 23) and for the consideration given customary water rights as being "approved de facto" (Article 87).

## Specification of Water Rights

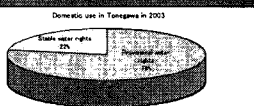


Vested water rights  
33.4%

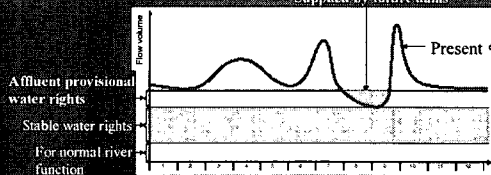
## Changes of Average Life Expectancy and Population served with Potable Water



## Affluent Water Rights -provisional



Supplied by future dams



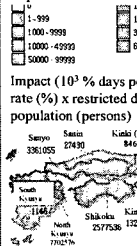
## River Law – drought conciliation

For a case in which an *unusual drought* makes it difficult to adequately use the river water for the permitted utilization purposes or when such a situation is expected, the persons who have obtained permission to use the water (hereinafter, permitted water uses) shall make efforts to consult with one another. In this case, *river administrators* shall exert themselves to provide necessary information for water use conciliation to achieve smooth consultations.

2. In conducting consultations according to the preceding paragraph, permitted water users shall respect the uses of the others.
3. For a case in which no agreement is reached through consultations according to Paragraph 1, the *river administrator* may, when it is requested by the permitted water users or when he deems it would seriously harm the public benefit unless urgent coordination of water uses is effected, conduct the necessary intermediation for coordination of water uses.

## Droughts in 1994

### Impact on domestic water use (1994)



Impact (10<sup>3</sup> % days persons) = restrict rate (%) x restricted date (days) x population (persons)

## Tongawa River



	Restriction rate		
	Agricultural	Industrial	Domestic
July 13, 1994 2 <sup>nd</sup> session	0%	0%	0%
July 19, 1994 3 <sup>rd</sup> session	10%	10%	10%
July 28, 1994 4 <sup>th</sup> session	20%	20%	20%
August 15, 1994 5 <sup>th</sup> session	30%	30%	30%
August 29, 1994 6 <sup>th</sup> session	20%	20%	20%
September 19, 1994 (end)			

### Kisogawa River

Agr. agricultural use Ind. industrial use Do. domestic use	Restriction rate (%)							
	Makino Dam			Akagawa Dam		Iwawa Dam		
	Agr	Ind	Do	Ind	Do	Agr	Ind	Do
June 1, 1994	5	10	5					
June 7, 1994	15	20	10			15	15	10
June 9, 1994								
June 11, 1994	75	25	15					
June 13, 1994						20	20	15
June 14, 1994	35	55	20					
June 15, 1994						25	25	17
June 17, 1994	40	40	22			30	30	20
June 23, 1994	25	25	15					
July 5, 1994	35	35	20					
July 7, 1994						35	35	21
July 9, 1994						50	50	25
July 11, 1994	45	40	22	20	11			
July 14, 1994	55	55	30	55	30	55	55	30
August 22, 1994	65	65	35	65	35	65	65	35
September 1, 1994	65	65	35	65	35	65	65	35
October 1, 1994	40	40	20	40	20	40	40	20
October 17, 1994	20	20	10	20	10	20	20	20
November 14, 1994 (end)								

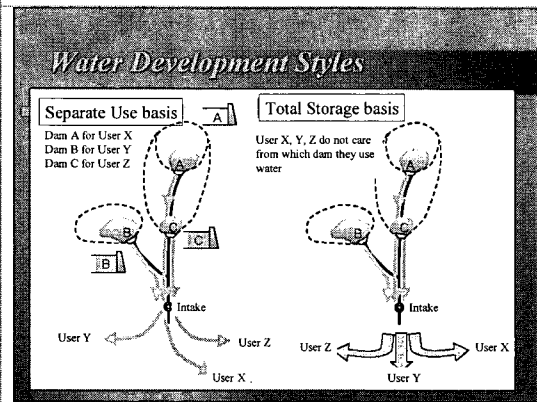
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### Yoshinogawa River

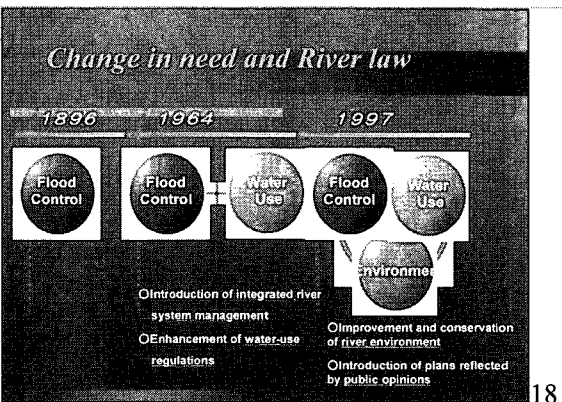
	Restriction rate		
	Kagawa	Tokushima	
		New rights	Priority rights
June 20, 1994	30%	30%	0%
July 4, 1994	60%	60%	0%
July 12, 1994	75%	75%	0%
July 24, 1994	0%	0%	0%
July 27, 1994	60%	60%	0%
August 10, 1994	0%	0%	0%
November 14, 1994 (end)			

\* continued after August 31, 1994\*

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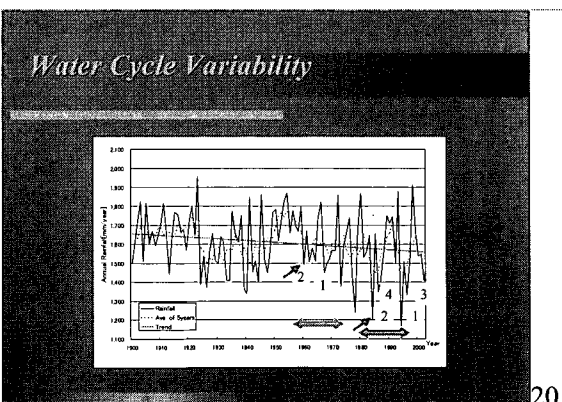
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### Needs for the Environment

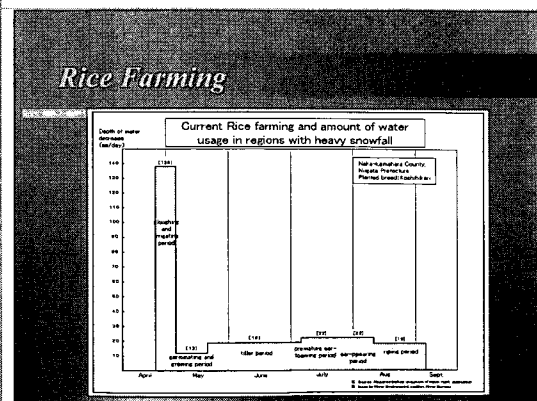
- Navigation
- Fishery
- Sightseeing
- Water quality
- Salinity
- Maintaining rivermouth
- Maintaining river facilities
- Groundwater level
- Landscape
- Habitats
- Recreation and so on...

1.3 m³/sec

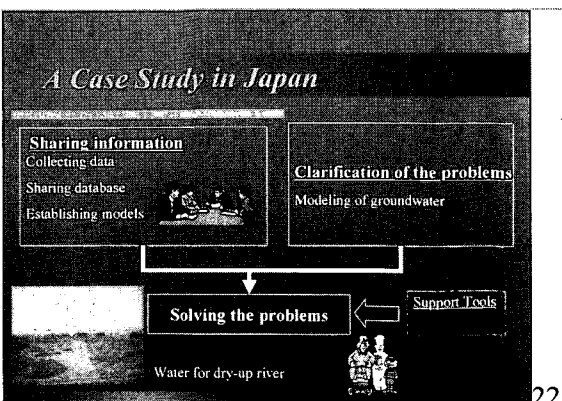
19



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*Summary*

Water rights and 1994 Drought experience

- Historical Backgrounds
- Legislation
- Drought Conciliation

Diverse needs and difficulty in development

- Consensus building

It is effective to share knowledge through exchanging experience in Asia.

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*Join our information exchange!*

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Thank you!

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