

# Urban Rivers in Transition -Malaysian Efforts at Rehabilitation



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## **1. General Information**





### **2. FLOOD PROBLEMS**









- Increasing flash floods in urban areas from river overflows
- up to 3 times a year
- Recede in a few hours
- Disruptive & needs a lot of clean-up







# **KUALA LUMPUR SKYLINE**

# •Expanding build-up

Close-up of new link-houses with concealed drains – also large impermeable surfaces

- Typical concrete-lined main drain from old housing area rapid disposal of stormwater to river

### Growth of Elevated Highways to ease traffic congestion – increasing rapid runoff to river

ICAL CALINES

Light Rapid Transit (LRT) lines 1990s - occupying river berms, retarding high flows RIVER CHANNELIZATION
Started as solution to flooding problem after major flood in 1971
'Rapid disposal' concept – increase capacity and quickly dispose of flood waters.

### MASJID JAMEK

### **RIVER CHANNELIZATION**

In some areas unavoidable due to high building density & narrow corridors

Concrete lined channels throughout KL – 1970s, 80s, 90s Very high cost, single objective

# BUT.. continued to flash-flood, and with increasing frequency

### **SRI MUDA, KLANG 1998**

### MEAN ANNUAL FLOOD ANALYSIS for SG. KLANG – shows alarming trend



#### 3116430 KLANG RIVER AT SULAIMAN BRIDGE TEST FOR STATIONARITY OF SERIES OF ANNUAL MAXIMUM DISCHARGES





### ALIGNMENT OF SMART



### **Tunnel Boring Machine break-through, June 2005**

### TBM No.2 NORTH DRIVE



### **Tunnel boring works 960m from North Junction Box**

# SG. BATU FLOOD DETENTION POND



### FLASH FLOOD CONTROL



## USMM

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#### URBAN STORMWATER MANAGEMENT MANUAL FOR MALAYSIA











### Promotion of multi-purpose dry ponds, unlined streams



# Promotion of upstream detention



# NEW PROBLEM: NEED FOR FUTURE RETROFITTING TO REVIVE URBAN RIVERS

Monotonous uniformity bad for habitat – no bends, loops, meanders, pools, rapids, esp. greenery
No gravels or stones on riverbed for egg-laying
No rocks or tree stumps for fish shelter

# Vision of living urban rivers in future – green, clean waters, fishlife



## Easier for areas outside city center

and a failed bit

### 3. WATER QUALITY – 3.1 SQUATTERS

50,000 In Klang Valley

- cf immigrant pop. 2 M
- 500 t/day load on Klang River
- 'Zero Squatter' policy KL, Selangor end 2005





### **3.WATER QUALITY –** 3.2 SOLID WASTE

- National Policy on Solid Waste being finalized
- Reliance on landfills
- Resistance to incineration

## **Need for low-cost GPTs**

- Gross Pollution Traps (GPT) to collect floating litter, debris and coarse sediment. Some designs also collect oil
- For implementation on large scale





### 3.WATER QUALITY – 3.3 SEDIMENT

### Biggest contributor – large housing developments with poor earthworks control

## **SEDIMENTATION OF RIVERS**

Too much sediment entering rivers
No green buffer zone to filter sediment
Incoming drains also concrete lined – no filtration capacity

# ESCP (Required before earthworks start)



### 3. WATER QUALITY OTHER SOURCES







**3.4 WET MARKETS** Need Gross Pollution Traps (GPT), treatment plants

### **3. WATER QUALITY**



- **Typical local Design**
- Designed for Asian kitchens
- Waste food trap
- Grease, Fats collection for recycling
- Easy maintenance, low cost



### **3. WATER QUALITY** 3.5 WORKSHOPS, CARWASH, SERVICE CENTERS

**BGG 5952** 

AAN GREE





# **Wetlands**



Need for research & data on local flora, absorption capacities, design mix, seed production, etc.



### **PROFILE OF UHI**

From: Heat Island Group Lawrence Berkeley National Laboratory

**Tulane University** 



Satellite image of UHI's in Kuala Lumpur

www.musicaecomputer.com

### **Trees absorb heat through :**

- i. Photosynthesis
  - Ieaves 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

#### JABATAN PENGAIRAN DAN SALIRAN

# But,....



Man made buildings & surface of concrete steel and tar :

Absorb solar heat Get hotter and hotter with increasing sunshine Radiates out the heat into surrounding air E.g. : building a mace tang-can be 70° c conpared to surrounding at lang of 30° c

### **KUALA LUMPUR**





Gap in rainfall trends between urban and green areas

# CONCLUSION

1. The Malaysian experience shows that concrete lining of urban rivers to increase capacity to carry away flood waters has many serious consequences when combined with complex urbanization. It can aggravate flood events severely and wipe out river habitat. Rehabilitation will be difficult, take time and will be costly.

2. Replicating Natural processes by containment of runoff at source will have to be the way forward to manage flash floods in urban areas.

3. Controlling pollution sources is also a long process. In the meantime, there is considerable scope for treatment strategies through bioremediation, wetlands etc. There is potential for collaboration in this area.

# CONCLUSION

4. Urban Heat Islands can affect microclimatic changes in large urban areas in the tropics, leading to increases in storm frequencies. As comprehensive guides are available from international initiatives, getting national momentum in this area will be the key to containment measures.

