27th November – 4th December 2013 Sri Lanka

Contribution of Hydropower to Enhance Water Security

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Content

- Overview of the Country & Power Sector
- Hydropower Contribution – Historic and Current
- Hydropower from Mahaweli Basin
- Water Security Basis
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- Conclusion

Overview of Country & Power Sector

- Installed capacity – 3,000 MW (approx)
- Peak Demand – 2,163 MW (2011)
- Energy Generation – 11,801 GWh (2012)
- Capacity Mix – Hydro 45% Thermal 55%
- Energy Mix – Hydro 29% Thermal 71% (2012)
- T&D Losses – 10.67% (2012)
- Electrification level – 94% (estimated)
- Per capita elect. consumption – 515 kWh (2012)
- Per capita energy - 439 kg OE
- Share of Elect. To total energy – 9.6% (2011)

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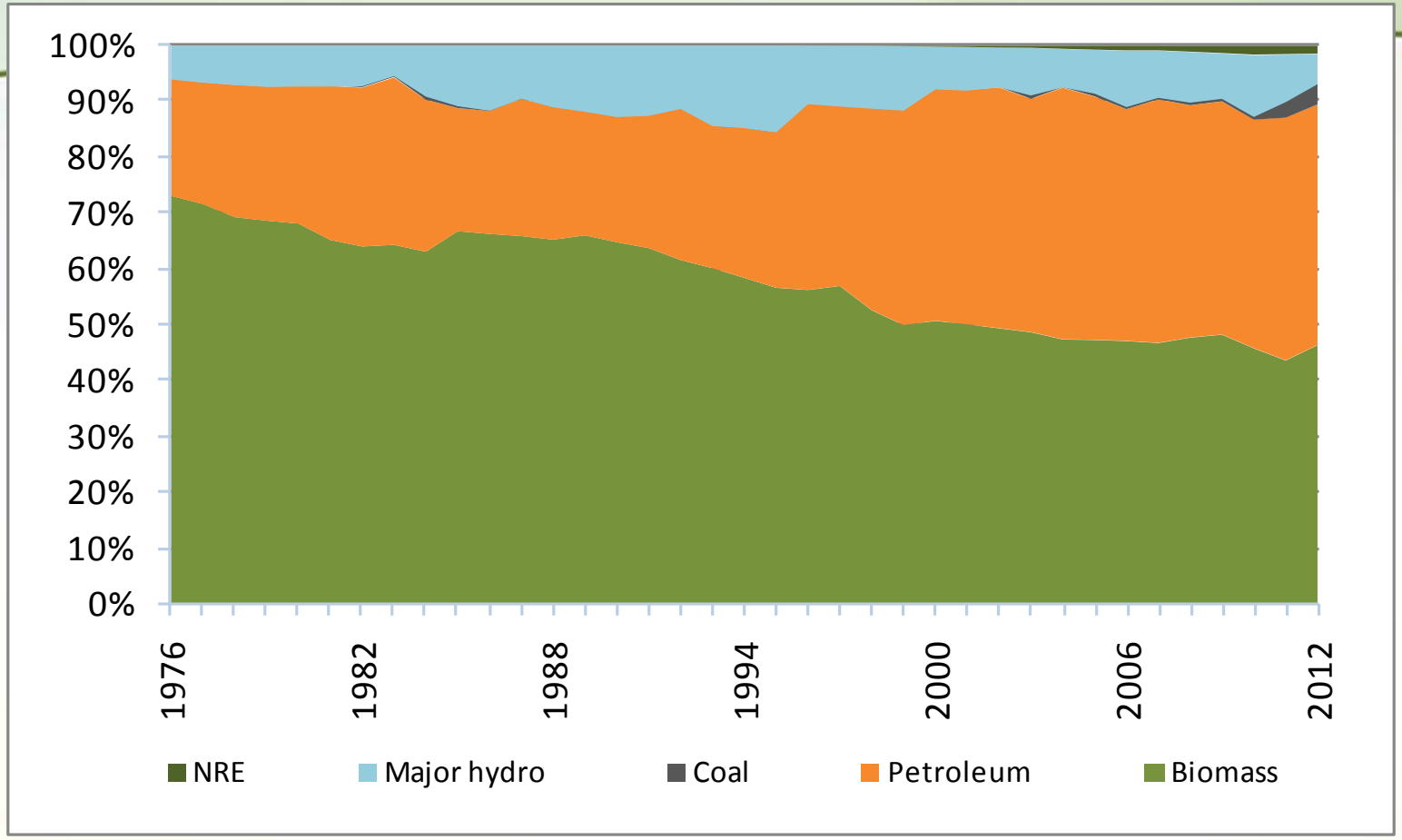
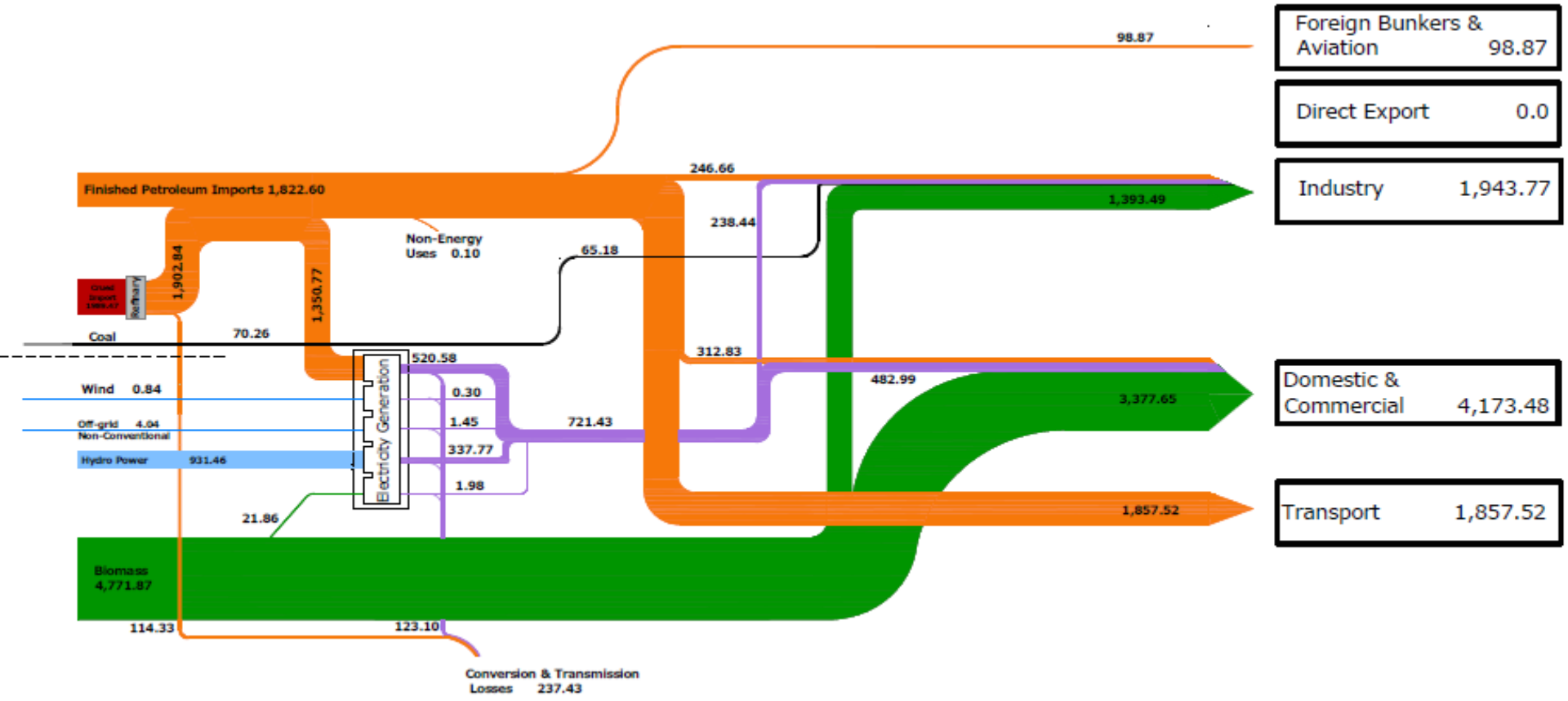
Primary Energy Share



Share of Gross Primary Energy Supply by Source

Energy Balance of Sri Lanka 2011



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Power Sector - Capacity & Generation

Capacity (Dispatchable)

- Thermal
  - Coal - 300 MW (CEB)
  - Oil Fired - 1,400 MW (CEB 570 MW)

  Total thermal - 1,700 MW
- Hydro -1,350 MW (CEB)

Total **- 3,000 MW approx.**

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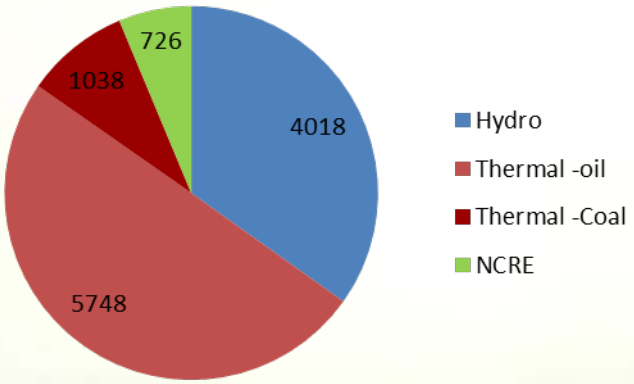
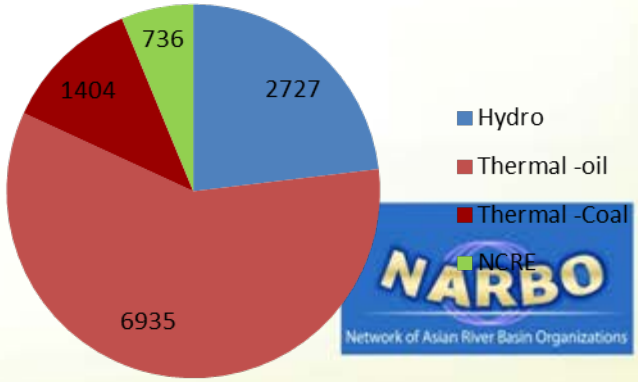
Mini hydro	- 234 MW
Wind	- 74 MW
Biomass	– 11MW

319 MW (non dispatchable)

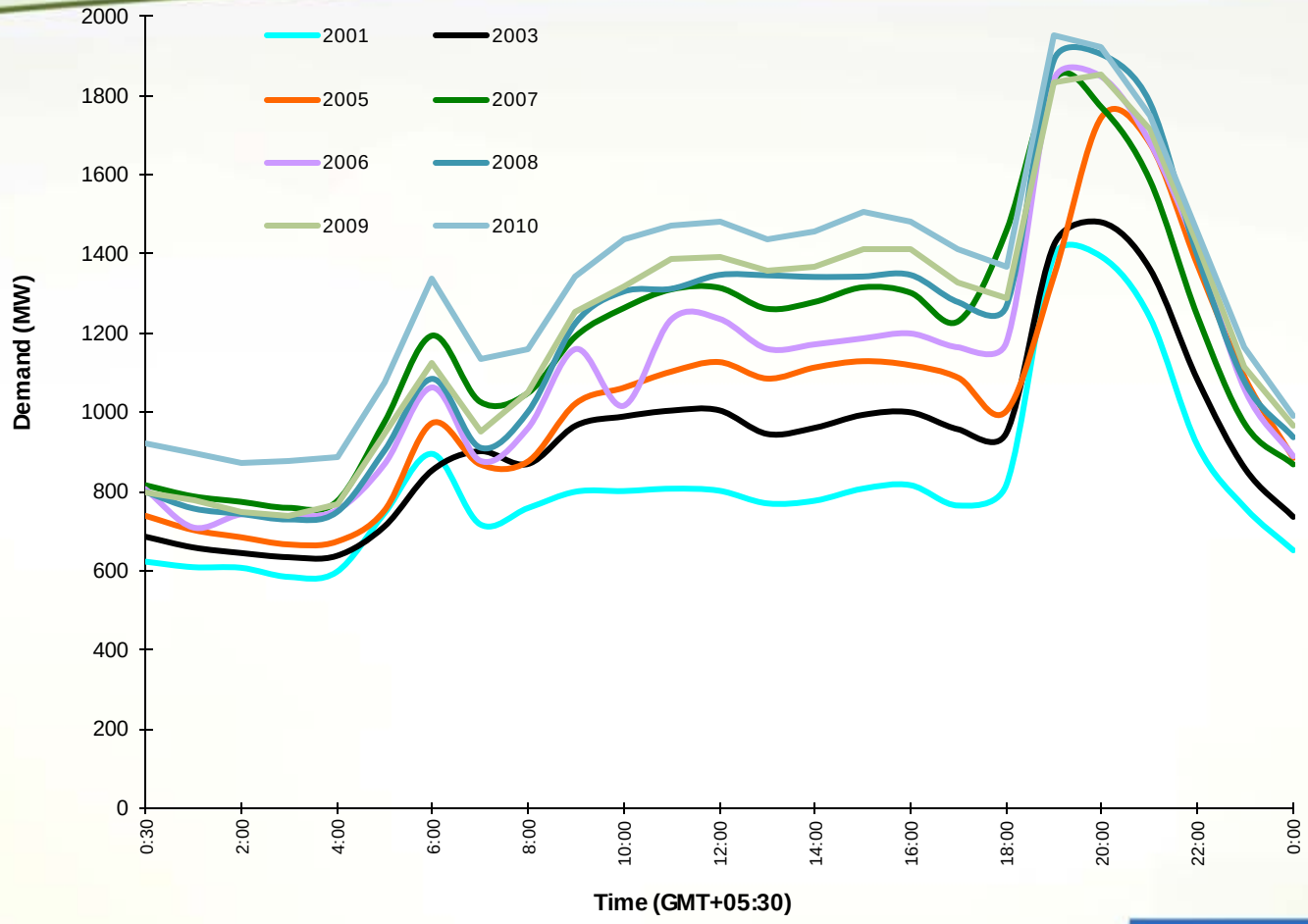
2011 Generation



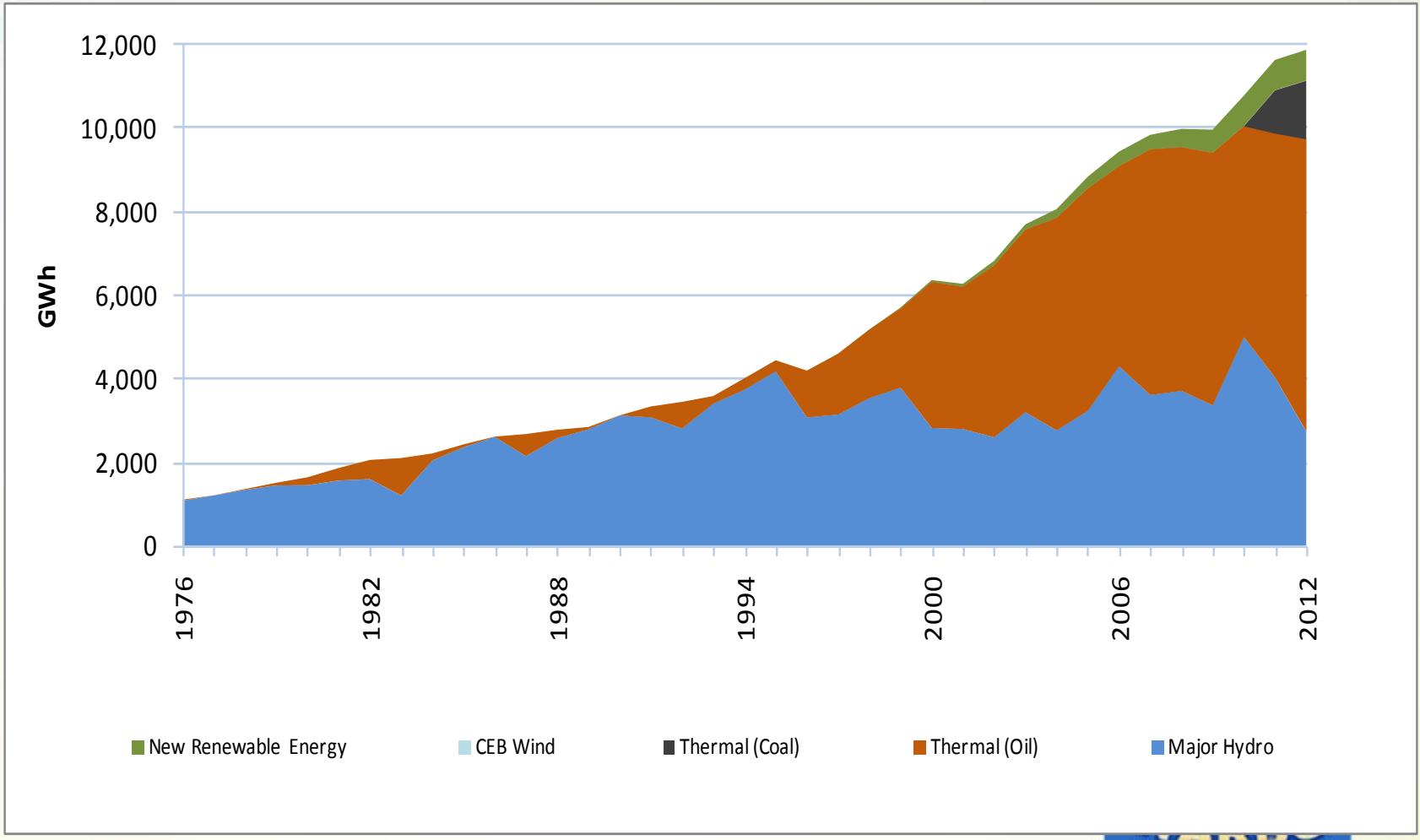
2012 Generation



Variation of Demand



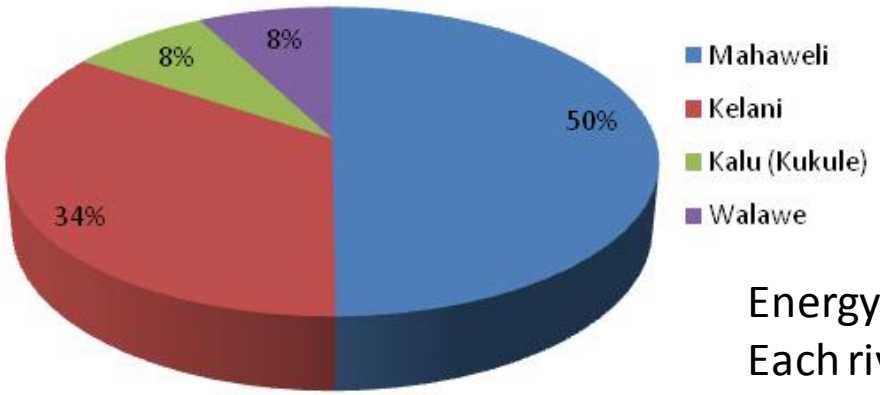
Hydro Thermal Historical Share



Hydro Power Contribution

Three hydro power complexes

- Mahaweli River – 810 MW
- Laxapana (Kelani River) - 335 MW
- Other (Kalu / kukule & Walawe River) – 200 MW



Energy Share of
Each river basin

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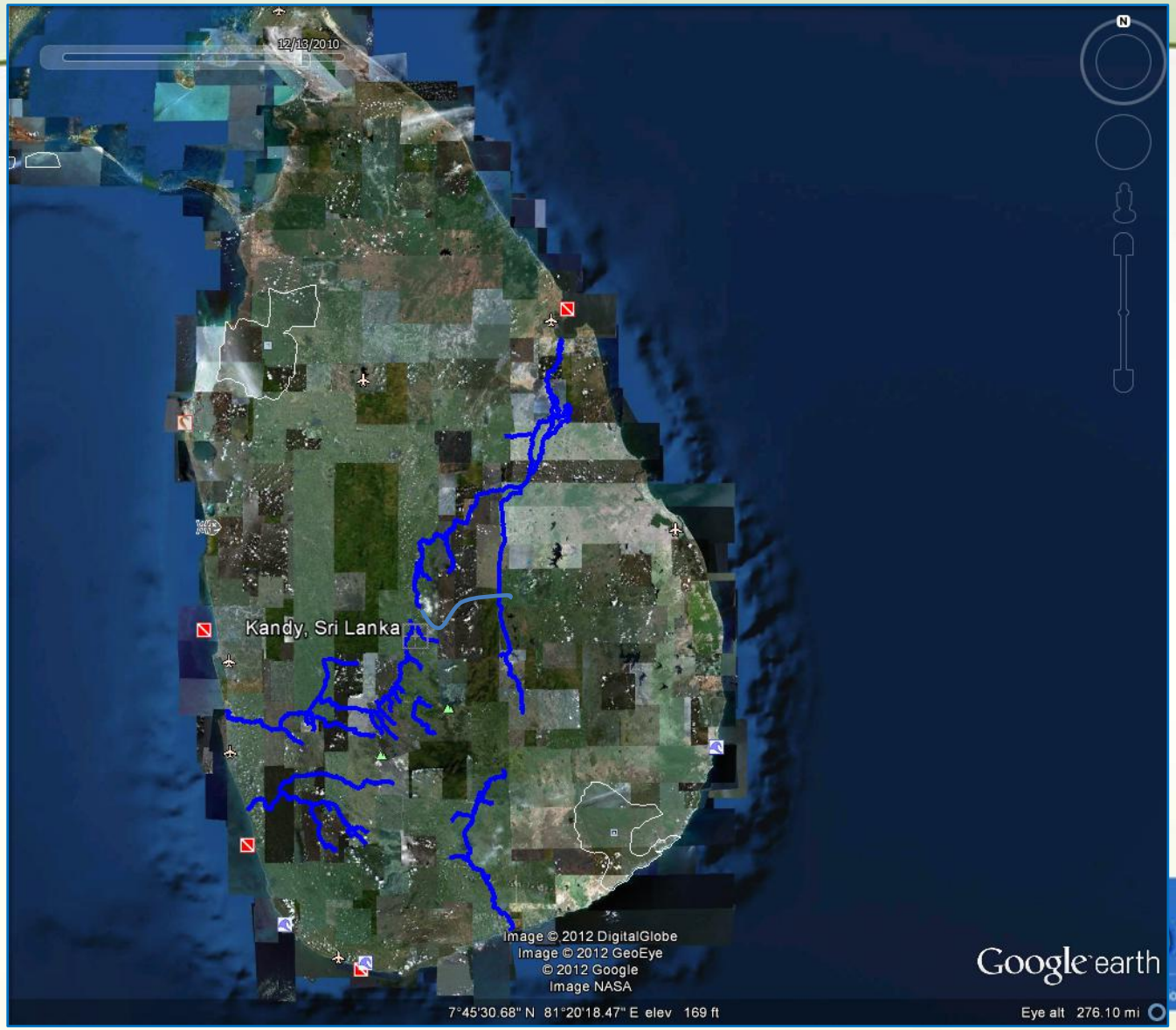
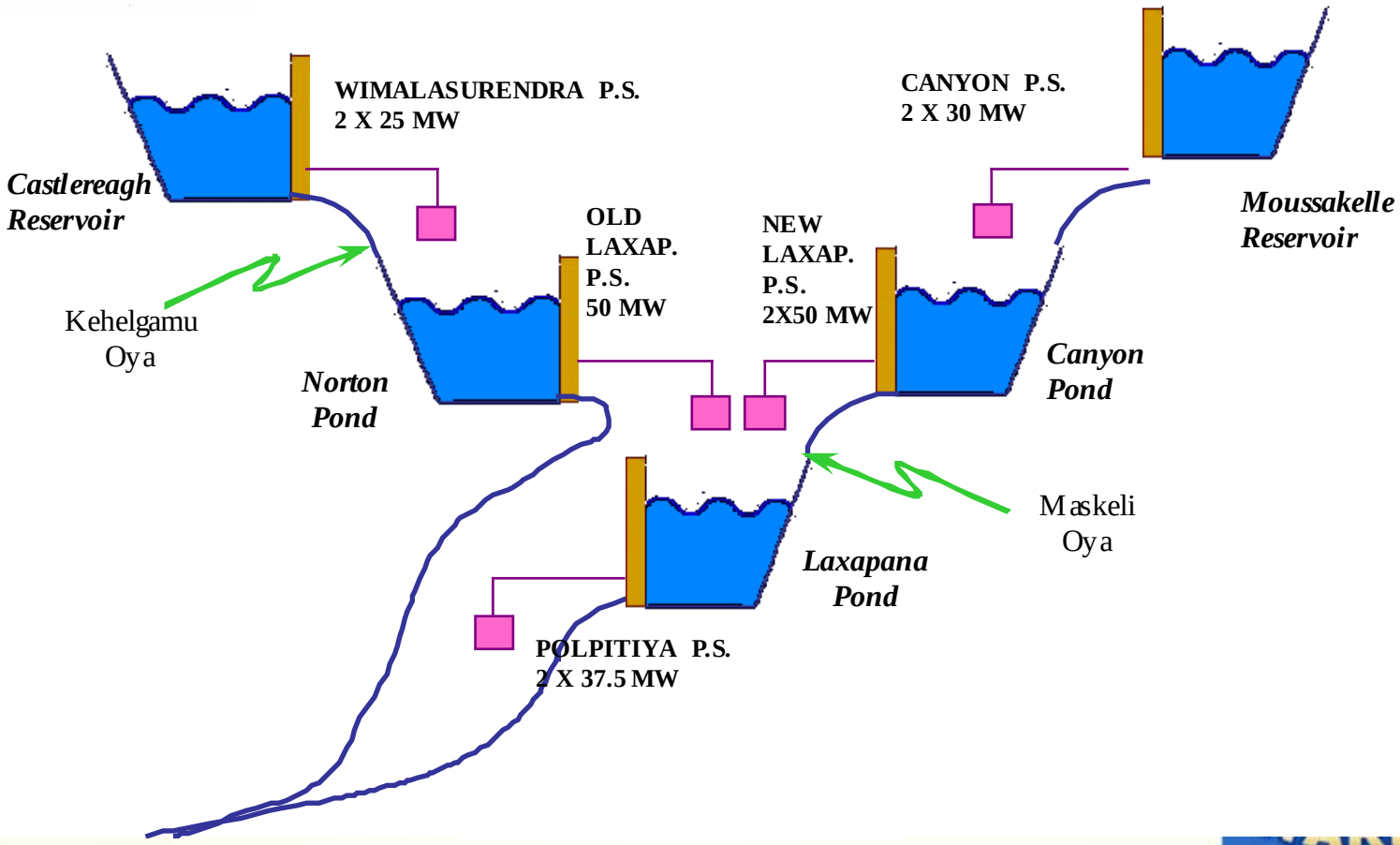
The Hydropower Related Rivers



LAXAPANA HYDRO POWER COMPLEX



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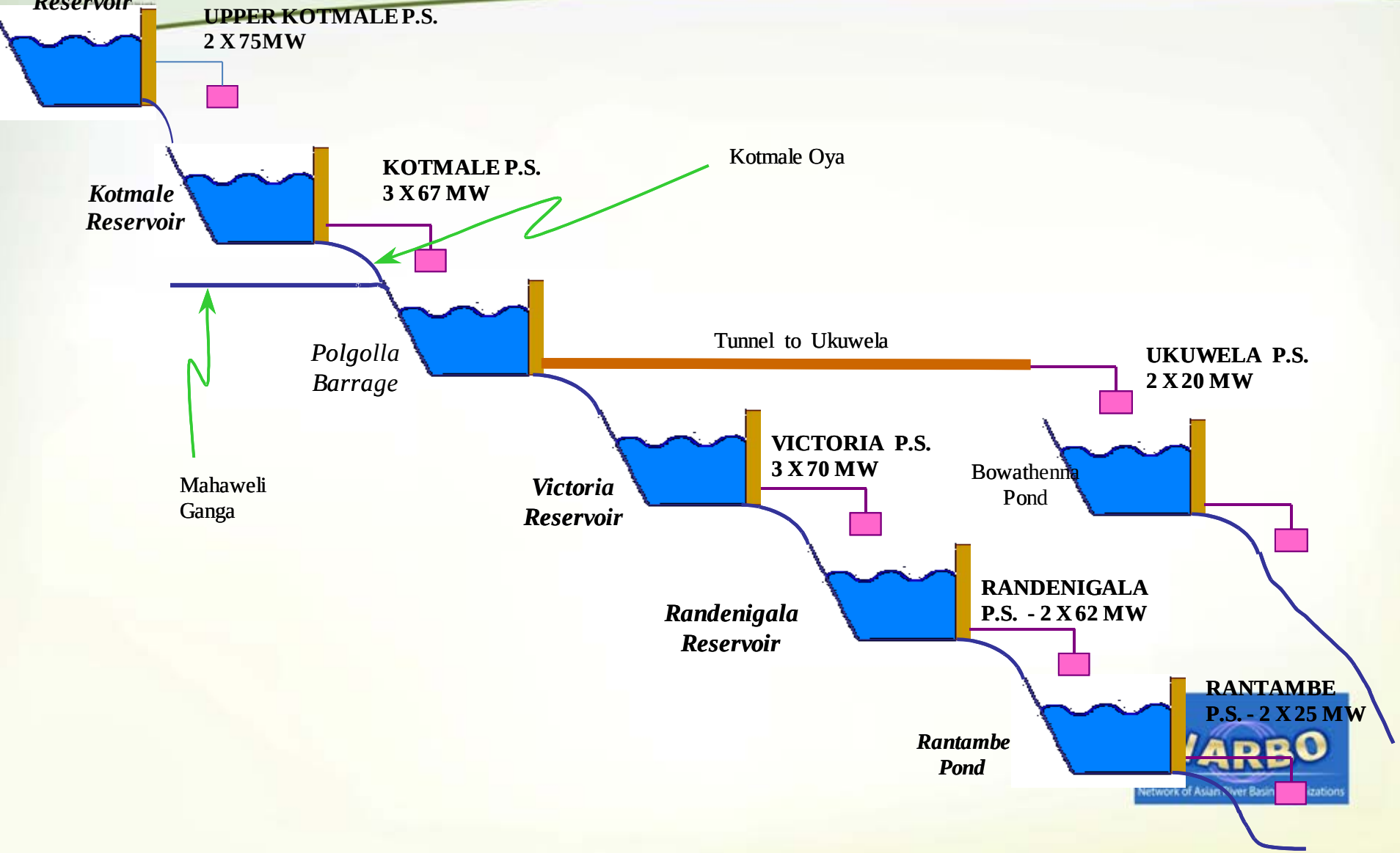
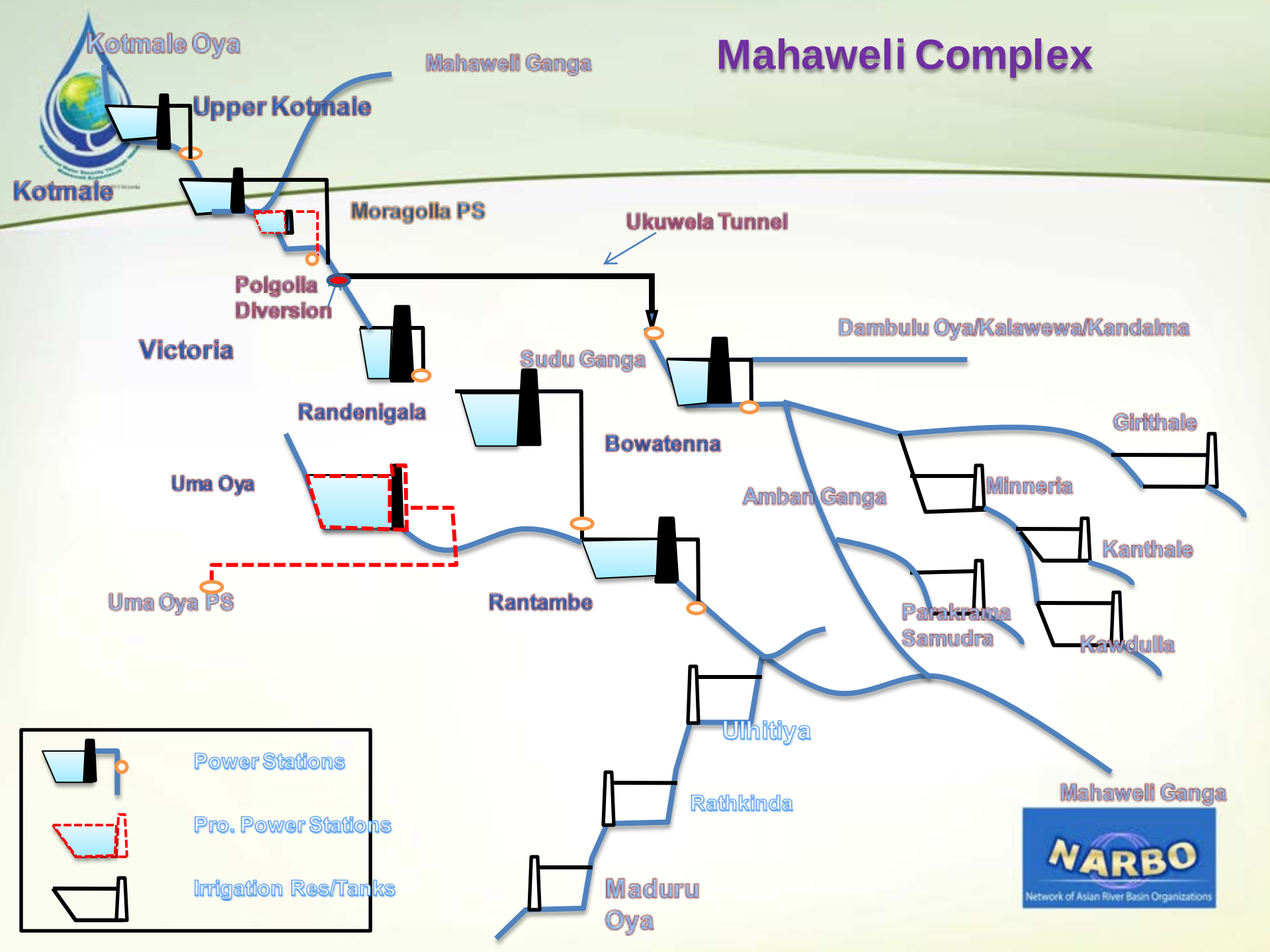
Mahaweli River Basin contd.

- Seven power stations
- Five in the natural river route
  - Upper Kotmale - 2X75 MW
  - Kotmale - 3X67 MW
  - Victoria - 3X70 MW
  - Randenigala - 2X60 MW
  - Rantembe - 2X25 MW
- Two in the diversion route
  - Ukuwela - 2X20MW
  - Bowatenna - 1X40MW

Mahaweli Hydro Power Complex



Mahaweli Complex



Water Security

Water Security Involves

- Optimum harnessing of rainfall
  - All available water should be harnessed to the best possible
- Storing excess for latter use
  - Reservoirs /ponds
- Optimized utilization of the stored water
  - Among sectors
    - Irrigation /power/town supply
  - Within sectors
    - Without waste / best coordination / highest efficiency
  - For the best socio economic benefit of country
    - Total macro picture - not one sector

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Hydropower Aspect

- Hydropower has both reservoir and run of the river types
- Reservoir type more relevant and important for water security
- Same for hydropower
- During planning /feasibility of reservoirs / multipurpose schemes support of hydropower sector assured
- Large reservoirs involve heavy expenditure
  - Large structures
  - Resettlement
  - Compensation

- Power sector relatively a more commercial operation compared to other sectors
- Hence the hydropower benefit makes an important contribution in feasibility as well as implementation
- Some Mahaweli reservoirs may not have been even built if the hydro power aspect was not there

Hydropower Aspect contd.

Operations

- Optimized use of stored water
- Hydro-thermal coordination
  - Use of software
  - Experience
  - Merit order dispatch
  - Use of historical hydrological data
  - Water management secretariat coordination
- Efficiency improvements in hydro plants
  - Laxapana Complex

IWRM in Power System Operation

- Stake holder organizations
  - Mahaweli Authority
  - Irrigation Department
  - Ceylon Electricity Board (CEB)
  - National Water Supply & Drainage Board

- Water Management Secretariat (WMS) is the coordinating institutional arrangement.
- All above agencies represented.
- CEB represented by System Control Centre – Dispatch Centre
- Weekly meetings are held
- Water requirement discussed and decided at these meetings
- Priority basis
  1. Drinking Water (town supply)
  2. Irrigation
  3. Power Supply

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Conclusion

- Water has multiple demands and hence sectoral demands are varying
- These demands are managed as IWRM thro the WMS in Sri Lanka
- Water storage has to be planned carefully considering all sectors
- Operational decisions have to be based on long term and macro results for the best water security
- Hydropower also plays an important role in achieving water security for multipurpose use
- In the Mahaweli basin too the hydro plants are operated by CEB in such a manner that water security is ensured.