Multi-Criteria Assessment Tools for Water Management

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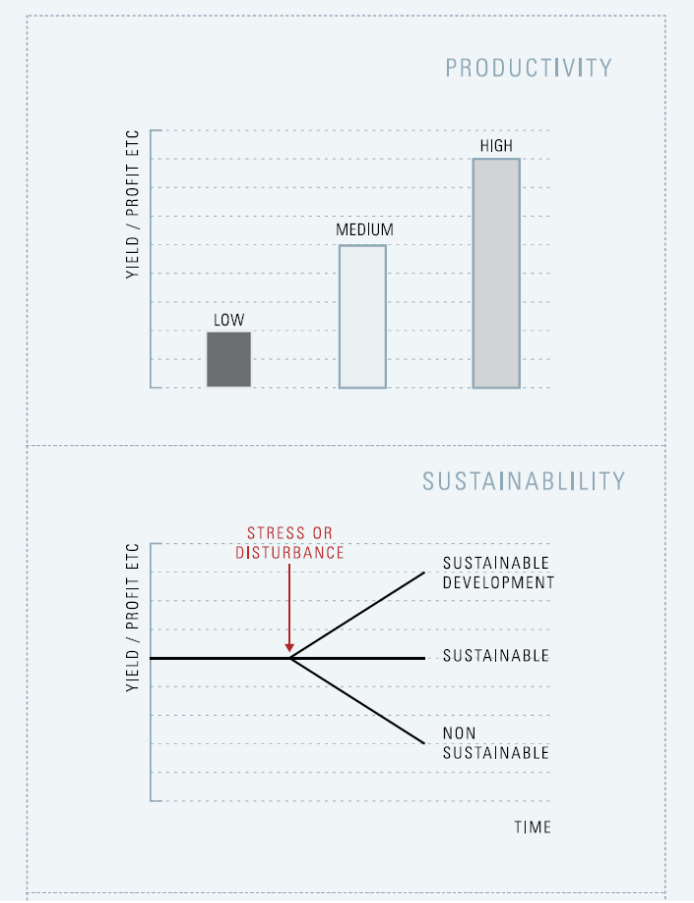
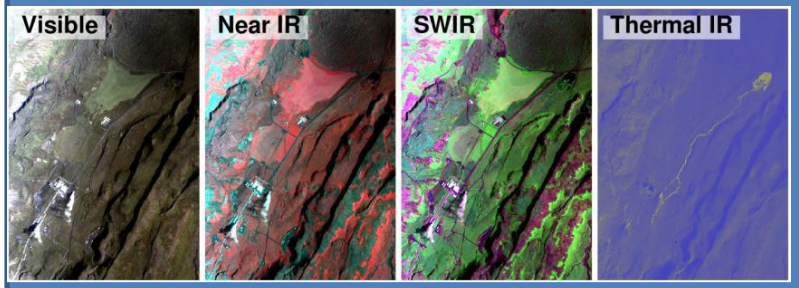
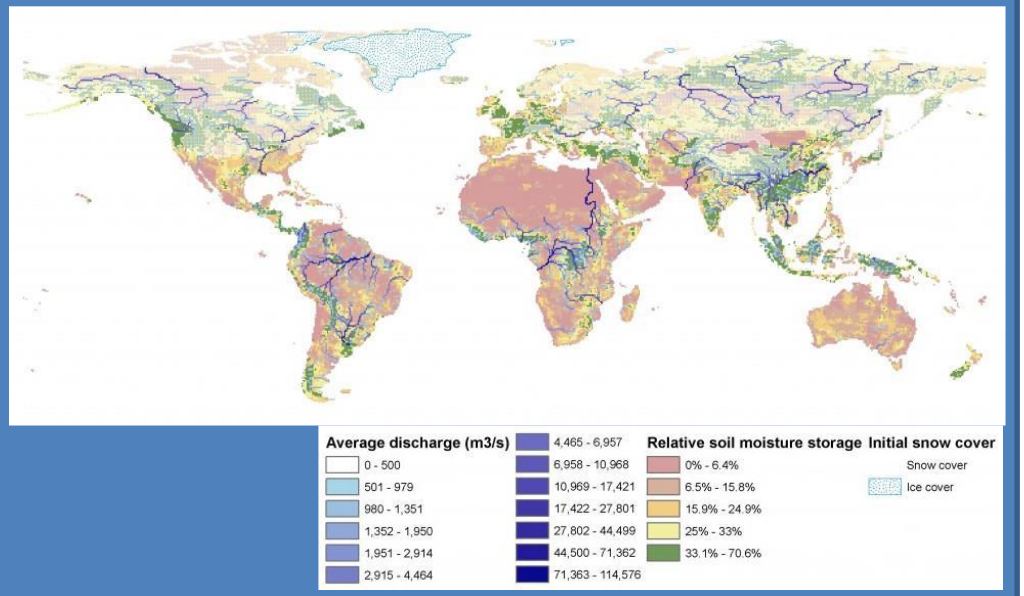
SYSTEM ATTRIBUTES



Remote Sensing



Hydrological models

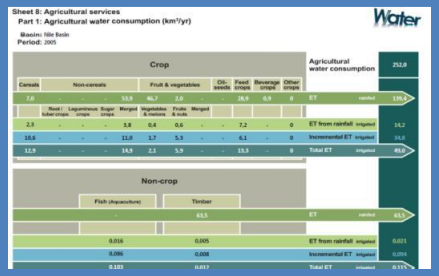


Ground measurements

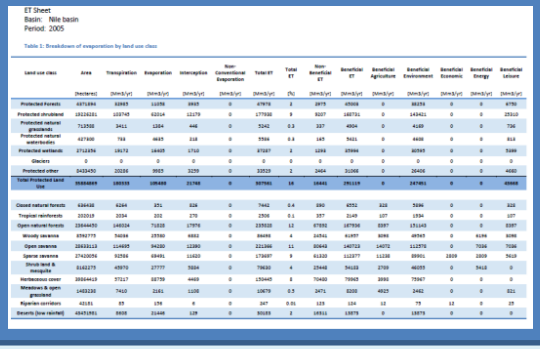
Inputs

Outputs

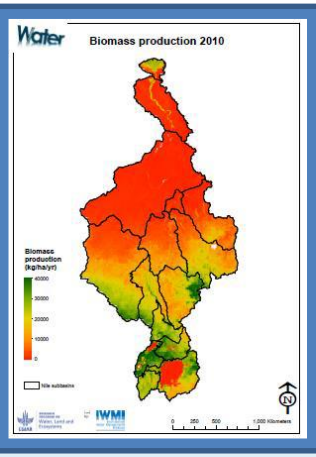
Sheets



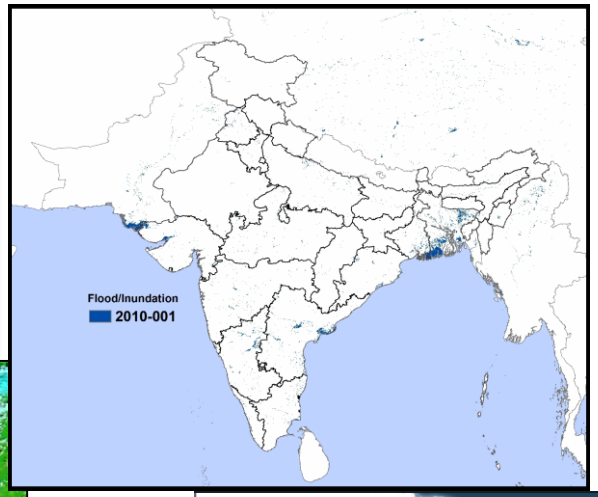
Tables

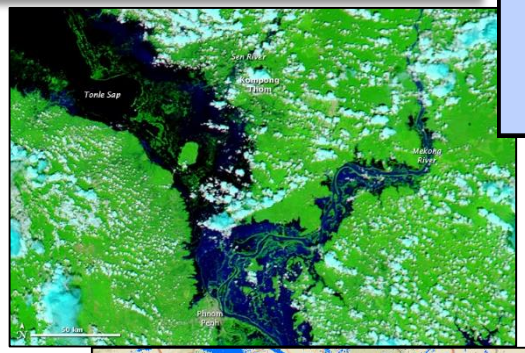


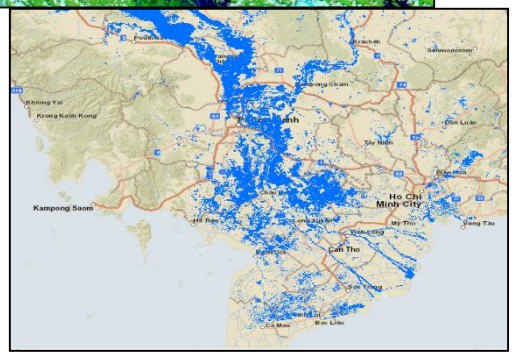
Maps



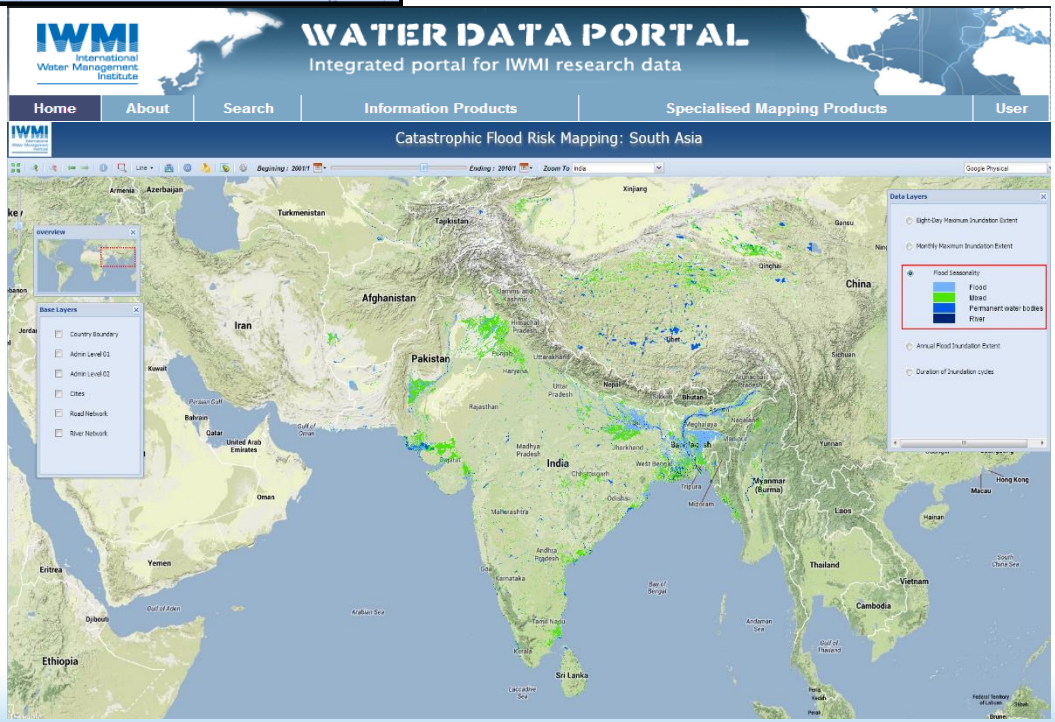
REGIONAL FLOOD RISK MAPPING - SA and SEA



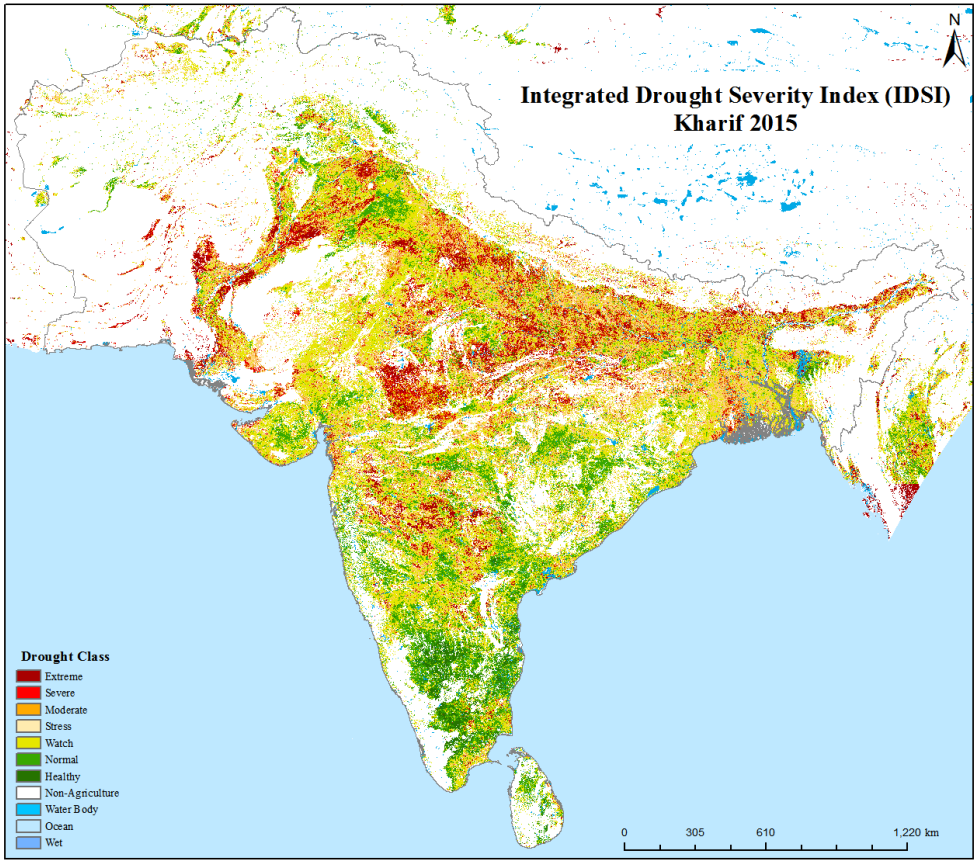


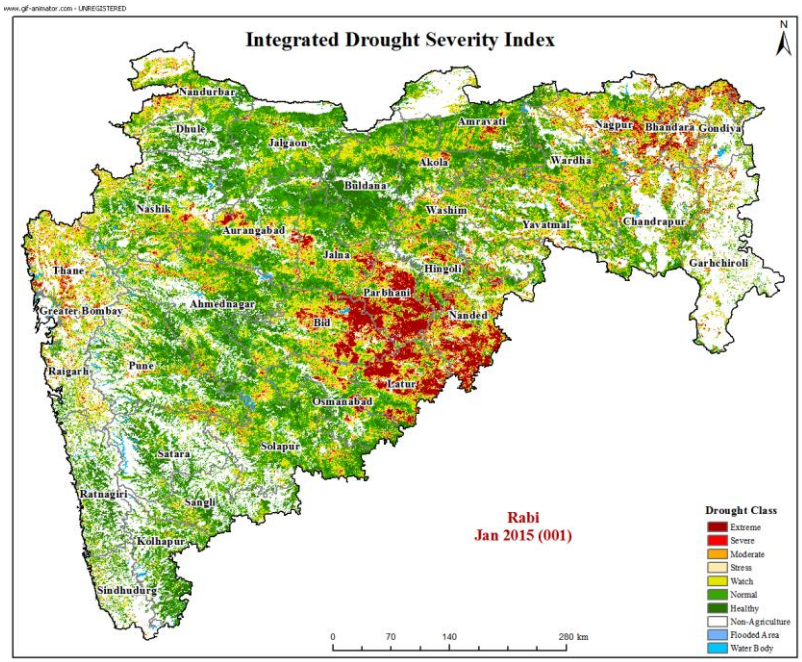


- Maping algorithm based on MODIS data
- 8-days maps of inundation extent
- Annual maps of maximum inundation
- Inter-annual variation of regional flooding extent



SOUTH ASIA DROUGHT MONITOR SYSTEM (SA-DMS)



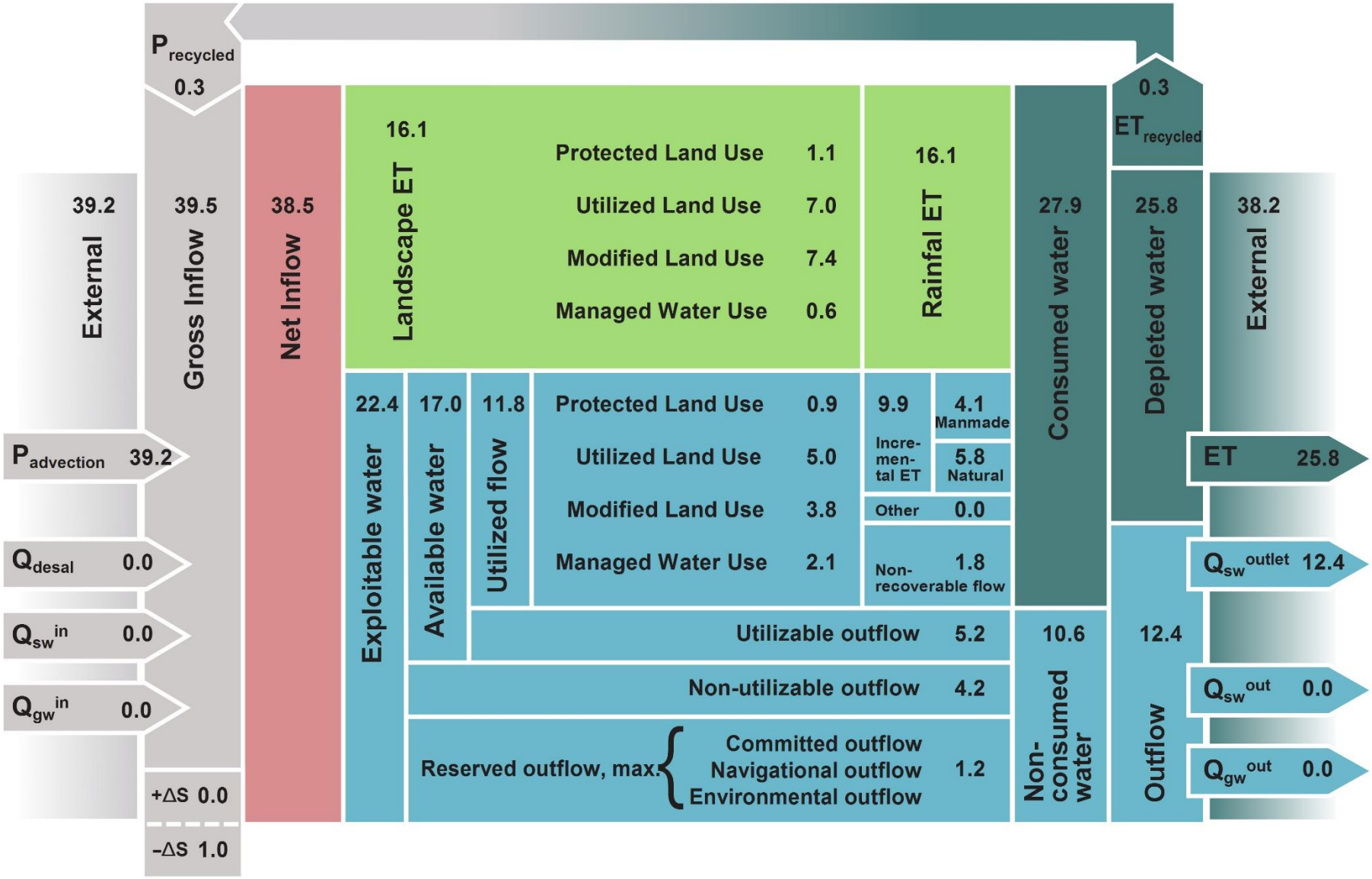


- First of its kind to establish for entire South Asia using multisource remote sensing observations;
- Historical drought risk mapping and assessment covering SA countries (2000 – Current);
- IDSI allows better understanding on drought frequency, duration over the 15years;
- Products are useful tools in drought mitigation studies and in decision-making process;

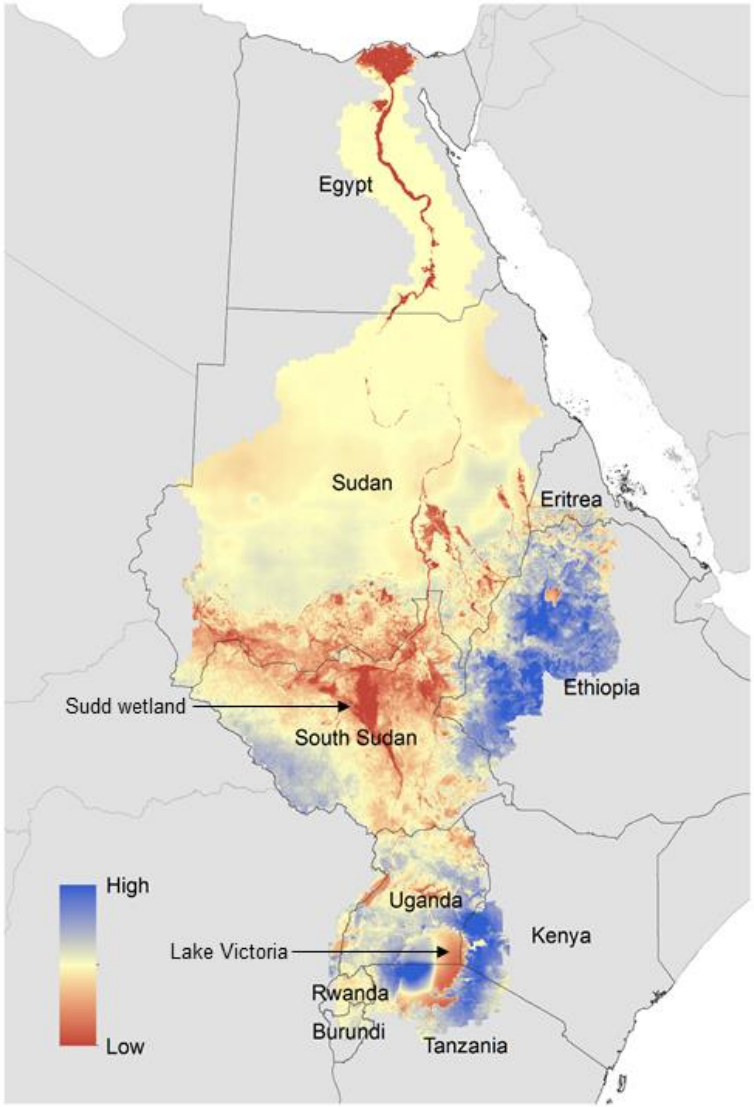
2015 field observations in Jalna, Maharashtra

Water Accounting: Basin Water Balance

Sheet 1: Resource Base (km3/year)

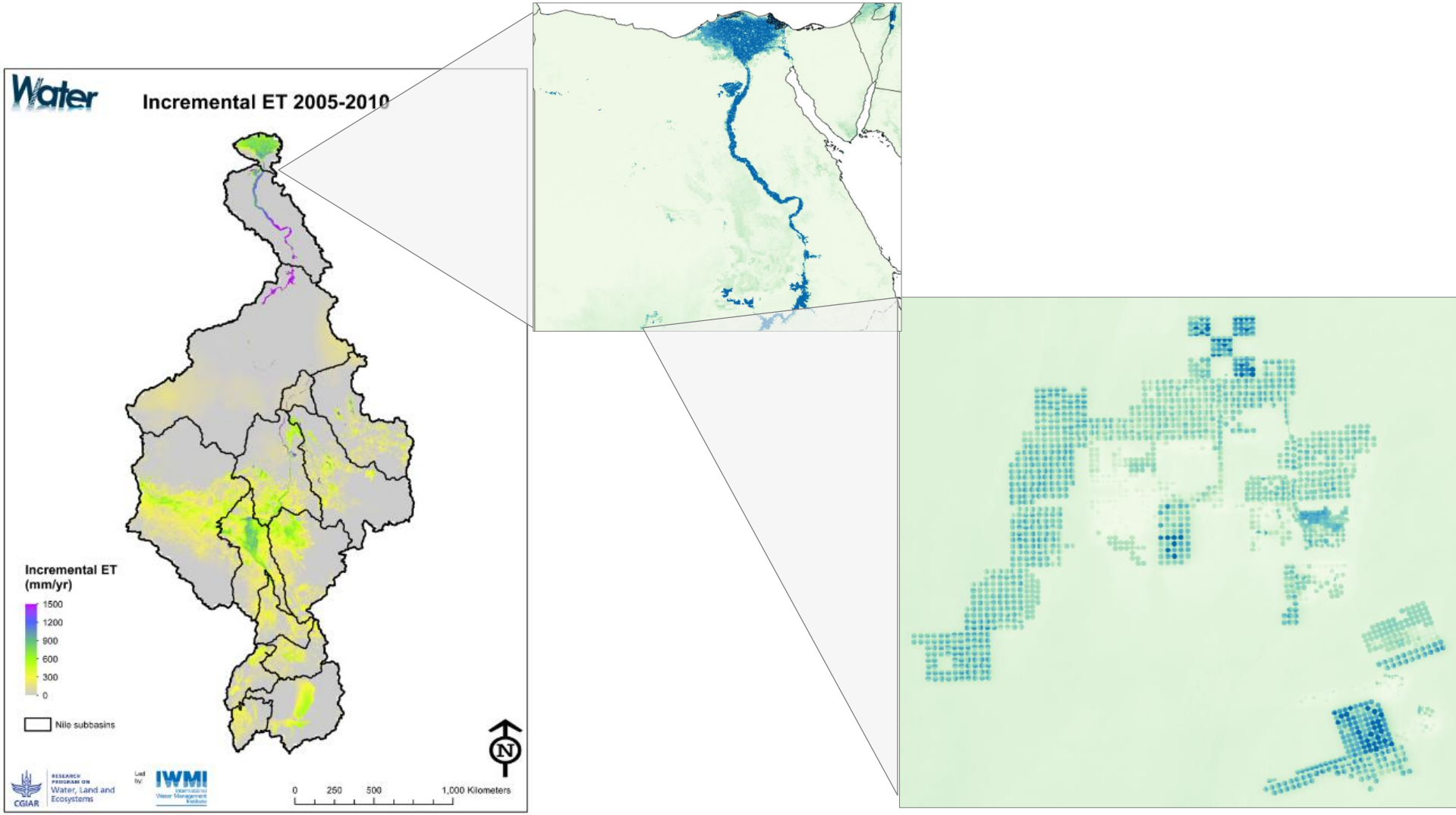


Nile Basin Water Accounts



- Almost all of the rainfall within the basin is consumed through evapotranspiration, with between 2% (dry year) to 3.6% (wet year) available as runoff (blue water) for allocation
- Map of rainfall surplus provides an indication of the areas that are important for generating runoff (and thus supporting water availability for downstream users) and those that support natural processes and have a high ET
- 20% of the net inflow originates from atmospheric moisture recycling; 26% of ET is recycled through rainfall within Nile boundaries (nb 40% in SE Nile region)

Water Accounting Across Scales



Water accounting….to water productivity….to irrigation performance

Solar suitability mapping framework

Parameters:

- Solar irradiation
- Landscape & crop
- Water resources (gw & sw)
- Proximity to markets
- Solar PV pump type

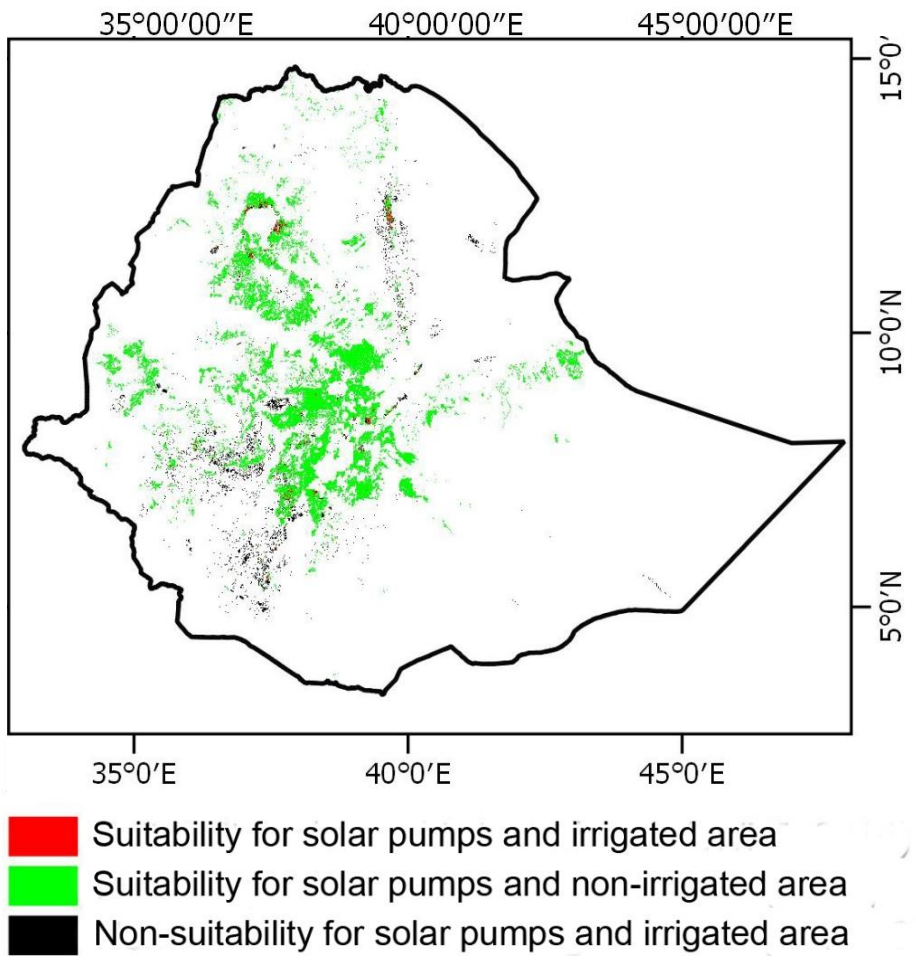
Steps:

- Constraints
- Reclassification & weighing
- Suitability analysis check (well depth, irrigated land)

Allows for specific solar pump type (solar energy requirement and dynamic pumping head limitation) to assess suitability for specific pump types

Suitability of solar PV irrigation Ethiopia

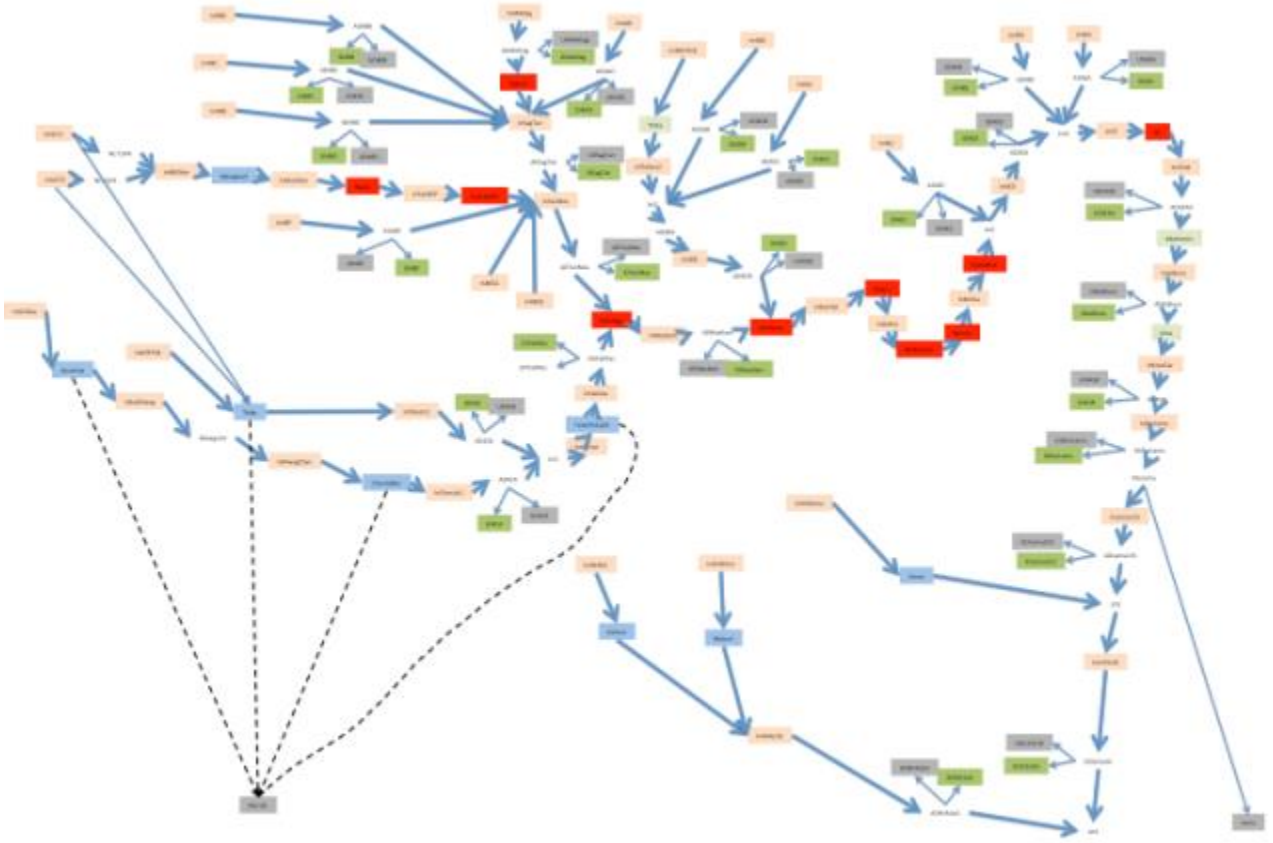
- Ethiopian government aims at irrigation expansion to 11M ha
- Solar irrigation potential :
  - GW (7m): **~2.1 M ha**
  - GW (25m): **~ 6.3 M ha**
  - GW & SW: **~ 6.8 M ha**
- Solar pump potential to support irrigated land is ~167,000 ha (15%)
- Solar pump potential to transform rain-fed agriculture is ~ 6.6 million ha (32%)



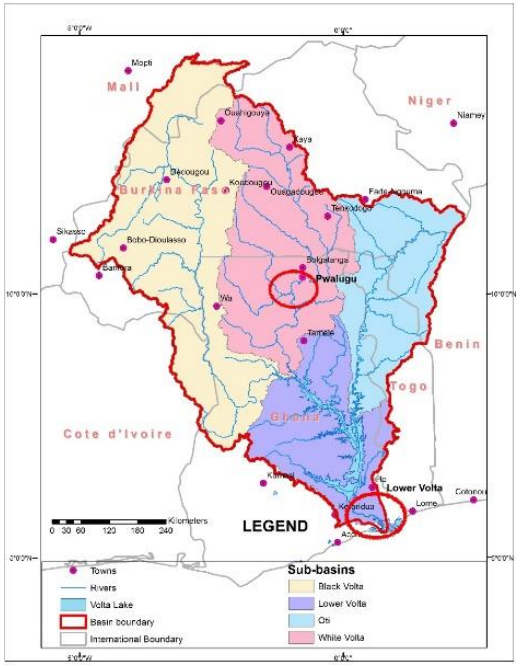
Schmitter, P., et al. 2018. Suitability mapping framework for solar photovoltaic pumps for smallholder farmers in sub-Saharan Africa Applied Geography, 94: 41-57

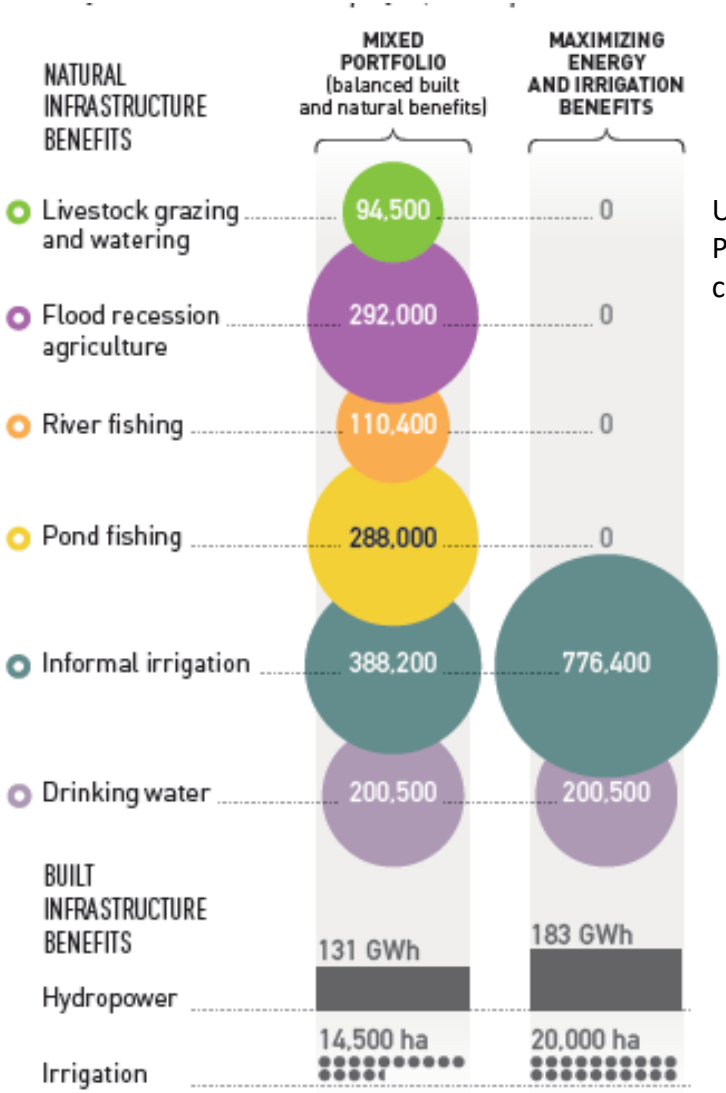
Modeling basin-level trade-offs

- Inflow (subcatchment)
- Water supply
- Hydropower
- Irrigation
- Urban demand
- River
- Abstraction/diversion
- Inter-basin transfer



Pwalugu Multipurpose Dam, Ghana

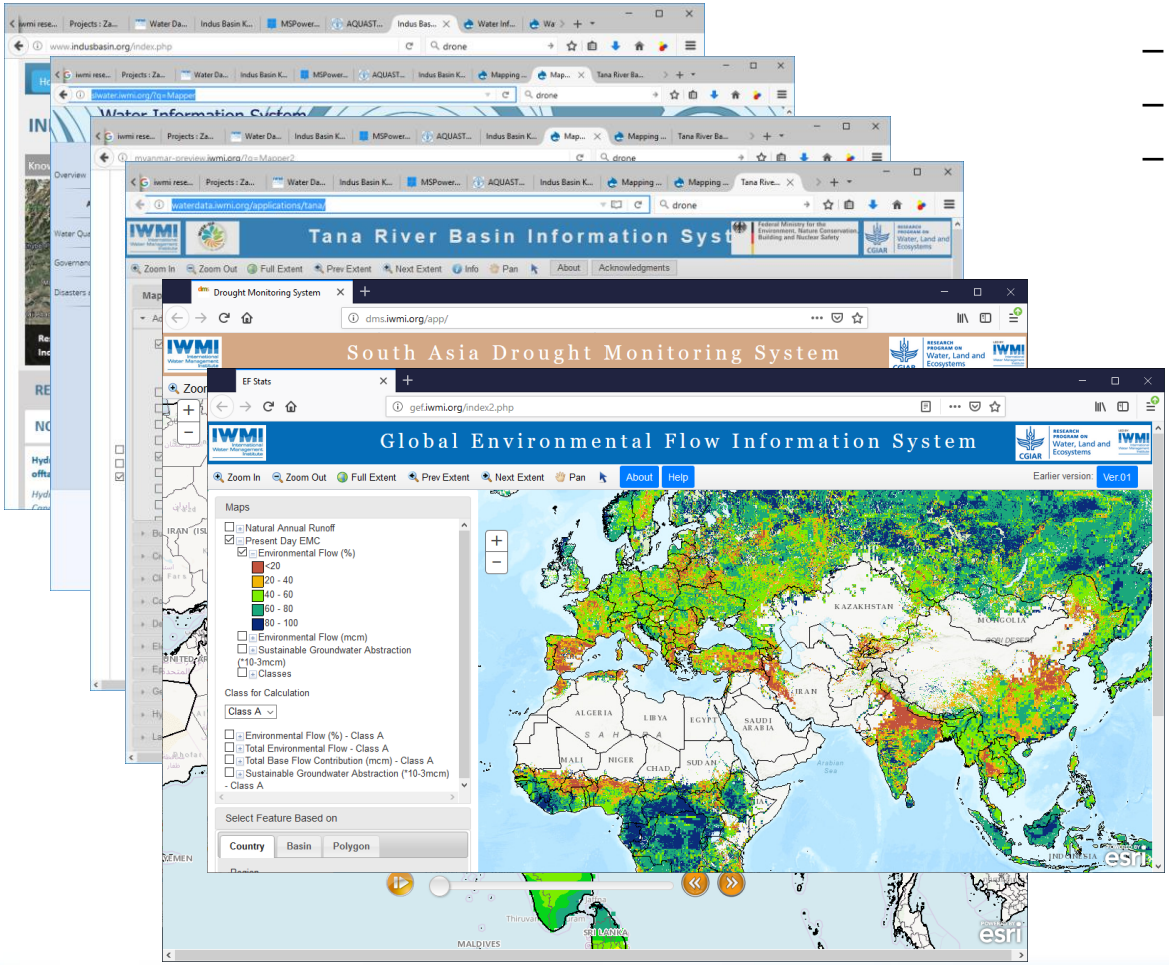




US$/yr
Pwalugu
communities

Information and Decision Support Systems

- Web-based information systems and options analysis



- Hydro-economic modeling and Decision Support
  - Systematic, network analysis
  - Modular
  - Multi-objective optimization
  - Water valuation, pricing, subsidies