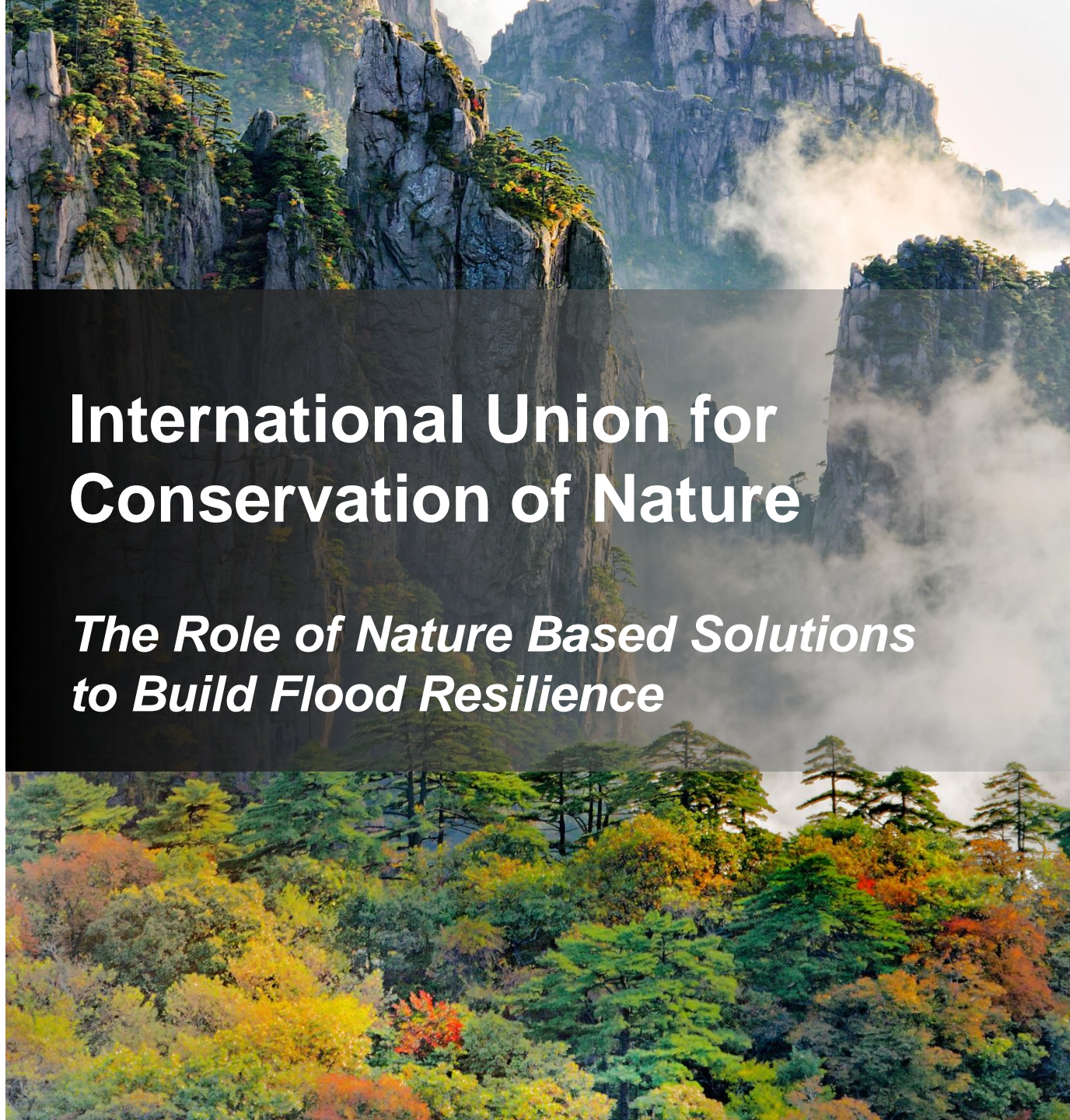




International Union for Conservation of Nature

The Role of Nature Based Solutions to Build Flood Resilience

James Dalton,
Director,
Global Water Programme



Water management is risk management

- We think of water predominantly in terms of risks – to people – to other infrastructure – to utilities – and finally, to the environment
- Extreme natural events create convergence in awareness, from the individual, to overall society, from policy makers, and the media

Every element of water management includes risk:

- Sewer line and piped networks
- Land use planning and flood hazard mapping
- Recognition of cross-sectoral needs is designed to reduce risk
- Avoiding water 'system' failure

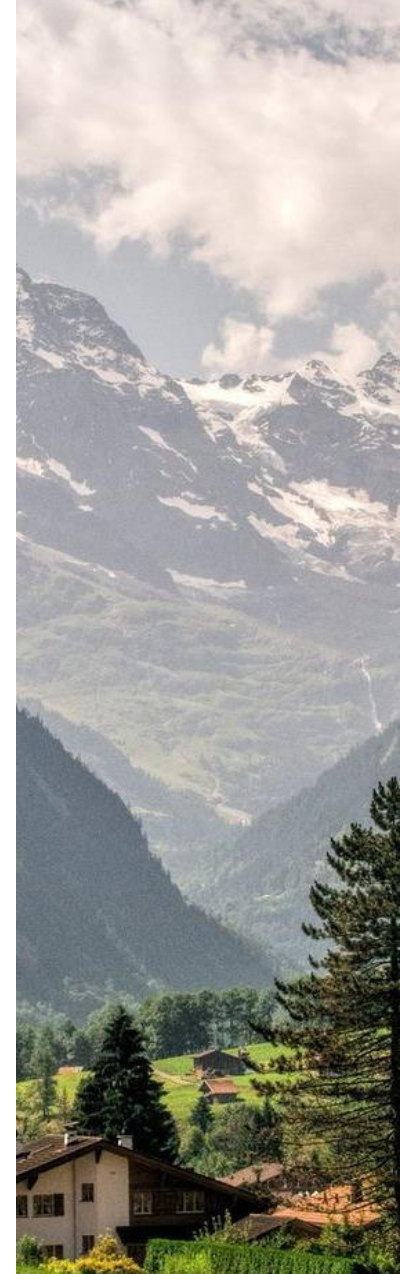






NBS have been mainstreamed in certain national legislation for years.

- Switzerland has, *de facto*, provisioned for the use of NBS for alpine hazard reduction since mid-19th century:
 - invests up to CHF 150 million per year in forest management for hazard reduction
 - 5-10 times less expensive than engineered structures for protection from flooding, landslides, rock falls, and avalanches
 - Additional recreational, biodiversity, tourist and carbon sequestration values



Flood Protection and Coastal Realignment in Europe

- One third of European coastlines have insufficient protection
- **UK coastal realignment:** recreating salt marsh, complements built sea walls by naturally absorb wave energy and lowering wave height (18% reduction per 40m)
- **Netherlands flood prevention:** 100m strip knotted willows reduces the size of 1m high waves by 80%
- Saves construction and maintenance costs
- Creates habitat, stores carbon, and coppiced willow shoots used as biofuel



Water Management and Control has huge opportunities to integrate nature based solutions



Water has convening power for disaster risk reduction interventions

- Affected goods
- Affected society
- Affected nature – to know what works and what does not
- Recognise the disaster gap post change

Integrated Risk Management into Natural Solution Planning

- Need land – agricultural
- Dense land use – networks of communication – rapid run-off
- Gaps in knowledge
 - ❖ water quality
 - ❖ flow and discharge
 - ❖ how much space? how much risk? cost? impact?
 - ❖ materials – bedload, erosion
- What should be allowed to happen – what is to be done to achieve an acceptable level of security and avoid risk?

Housing targets, employment targets, regeneration need, or lack of understanding

(U.K. survey on why advice from EA not followed for floodplain development)

SOFT SOLUTIONS – ARE SOCIAL

- Institutional change and reform - solutions are often institutional in nature – policy conflicts
- Soft solutions maybe politically and socio-culturally harder, but they are often far cheaper
- ‘Water’ can provide strong ‘community institutions’ – Water user Associations, Irrigation Unions, Growers, Watershed Councils – the principle of subsidiarity has multi-sector benefits – one being risk reduction
- Land management has the most critical role to play





Supported by:
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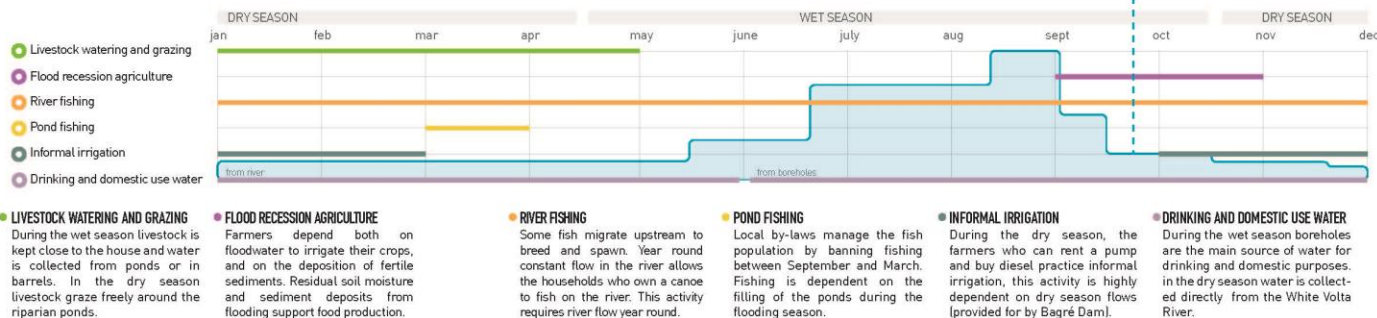
WISE-UP TO CLIMATE

In the Upper East region, Ghana, natural infrastructure benefits provide Pwalugu communities with an average annual income of 1,360 USD (including baseflow benefits). Seasonal flooding supports a range of livelihood activities corresponding to 53% of total household annual income. The proposed Pwalugu multi-purpose dam, depending on how it is operated, will potentially impact the natural infrastructure benefits.

Pwalugu livelihood activities based on seasonal flow regime

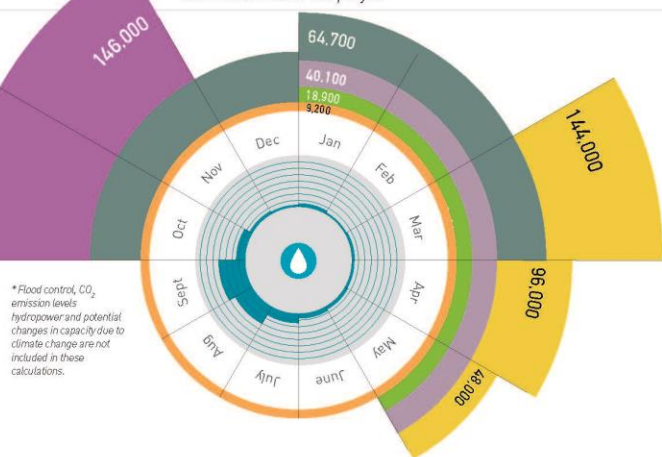
Pwalugu communities rely heavily on the seasonal flooding regime of the White Volta River where flooding peaks in August/early September during the wet

season. Note that production and retrieval of the benefits is not simultaneous. This seasonal calendar of livelihood activities mapped to river flow shows the current system in which the Pwalugu area benefits from natural infrastructure (seasonal flooding and fertile floodplains) as well as built infrastructure benefits from the upstream Bagré dam (in Burkina Faso), which regulates flow to reduce extreme flooding.



Valuing the annual benefits derived from timing and quantity of river flow*

Values based on 2015 USD per year



CURRENT FLOW REGIME (after the Bagré dam)

The building of the Bagré dam provides additional dry season flows supporting year-round river fishing and drinking water supply as well as water for small scale informal irrigation. The Bagré dam still enables the livelihood activities derived from natural infrastructure. Cumulatively, over a year Pwalugu communities earn up to 1,37 million USD.

1,373,600 USD
the contribution per year to the Pwalugu communities

River discharge at Pwalugu
for period 1996-2010
in m³ per second.

- ECOSYSTEM SERVICES**
- Livestock grazing and watering
 - Flood recession agriculture
 - River fishing
 - Pond fishing
 - Informal irrigation
 - Drinking water

POSSIBLE FUTURE flow regime after the Pwalugu dam

Maximising energy production and large scale irrigated farming will reduce seasonal flooding and in turn the income generated from associated livelihood activities. Cumulatively, over a year this scenario would reduce Pwalugu communities income by 286,000 USD.

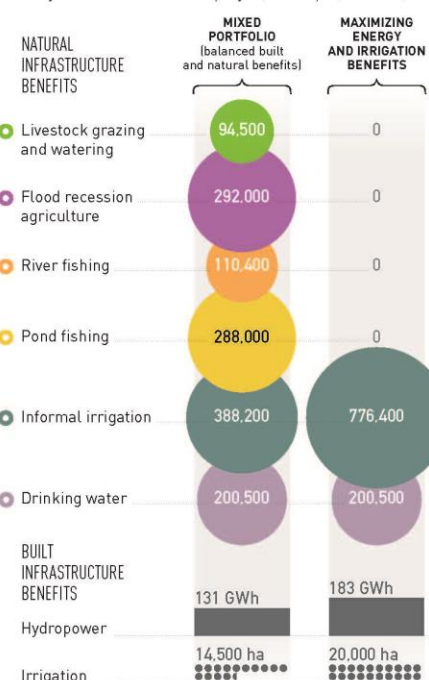
1,087,300 USD
the contribution per year to the Pwalugu communities

River discharge at Pwalugu estimated
based on optimising hydropower
and irrigation in m³ per second.

- ECOSYSTEM SERVICES**
- Livestock grazing and watering
 - Flood recession agriculture
 - River fishing
 - Pond fishing
 - Informal irrigation
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Different operating options for Pwalugu dam

Yearly values based on 2015 USD per year; total output (12 months)



- Cost Effectiveness
- Leveraging multiple benefits
- Integrated Blended – Green and Grey
– Natural and Built Approaches
- Accelerate implementation through
Complementary Natural Investments
with Built (asset mgmt.)
- Education and Learning from Events





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