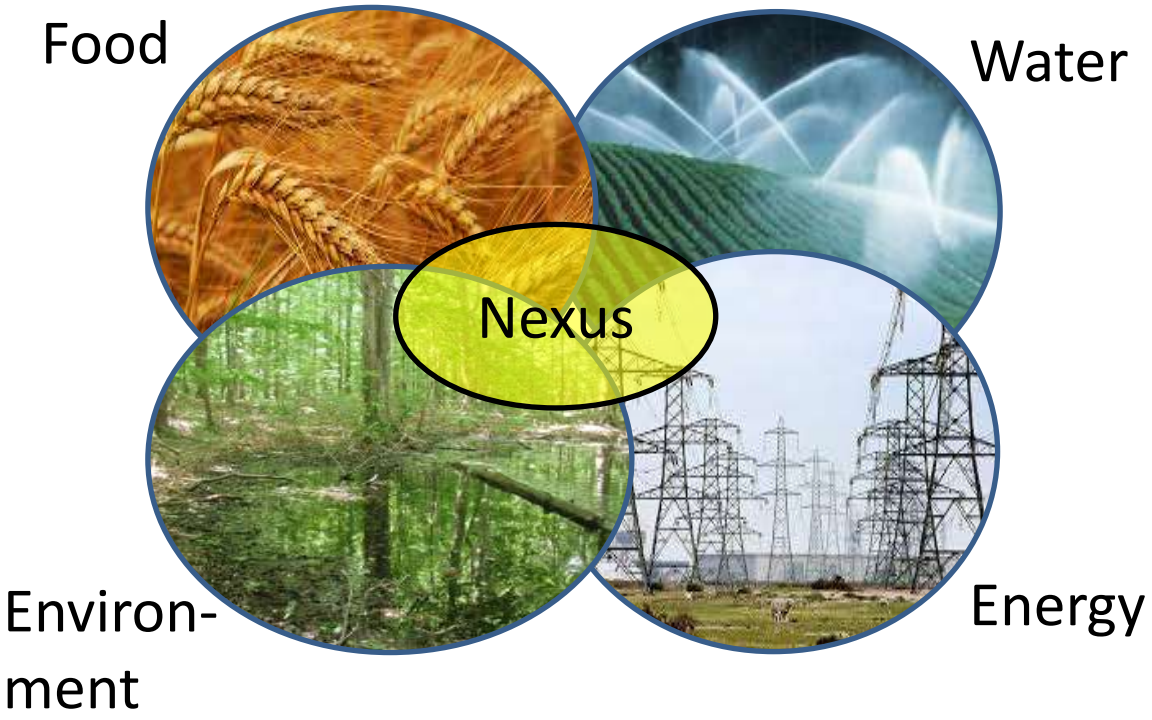
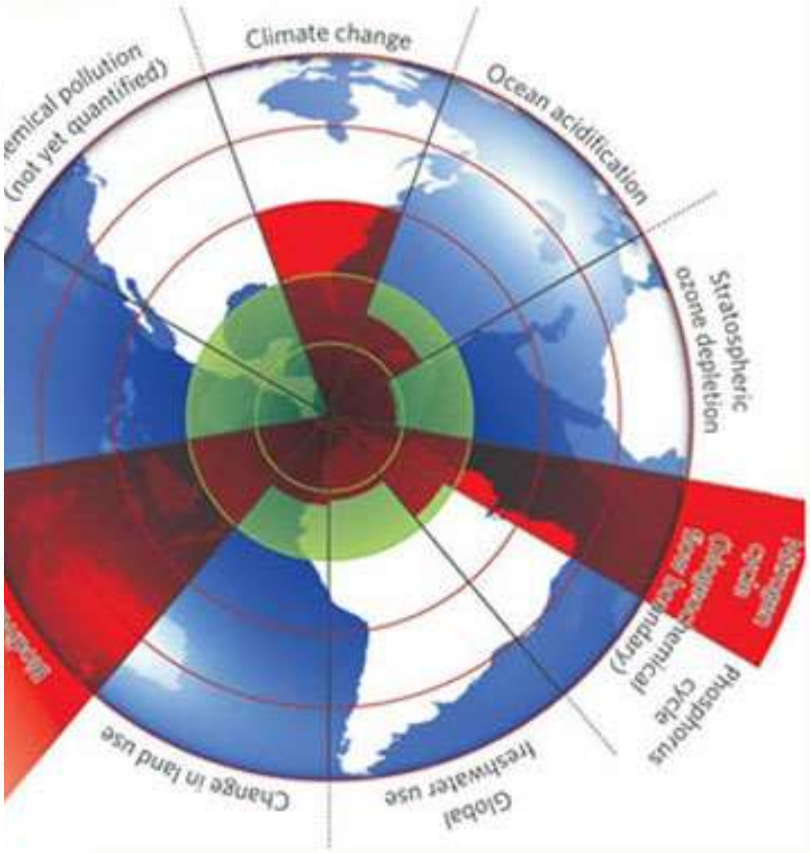
Exploring normative frameworks for the FE2W nexus

Bruce Lankford, Oxford , June 2014



As an example: the planetary boundaries framework is 'normative'. It attempts to guide us towards sustainable living or the idea of *sustainability* as a norm. There is a 'thesis' or an 'ought' implied in the framework.

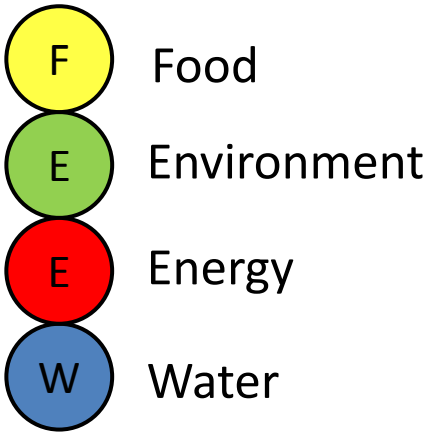
Planetary Boundary	Measurement	Proposed Boundary	Current Status
Climate Change	Carbon dioxide concentration	350	387
Rate of biodiversity loss	Extinction rate (species per million/year)	10	>100
Nitrogen cycle (one boundary with phosphorus cycle)	N2 removed from the atmosphere for human use (million tons/year	35	121
Phosphorus cycle (one boundary with nitrogen cycle)	P flowing into the oceans (million tons/year)	11	8.5 - 9.5
Stratospheric ozone depletion	Concentration of ozone	276	283
Ocean acidification	Average global surface ocean saturation state (aragonite)	2.75	2.9
Global freshwater use	Consumption of freshwater by humans (km3/year)	4,000	2,600
Change in land use	Global land cover converted to cropland (percent)	15	11.7
Atmospheric aerosol loading	Particulate concentration in the atmosphere	to be determined	to be determined
Chemical Pollution	E.g. amount emitted to or concentration of pollutants	to be determined	to be determined

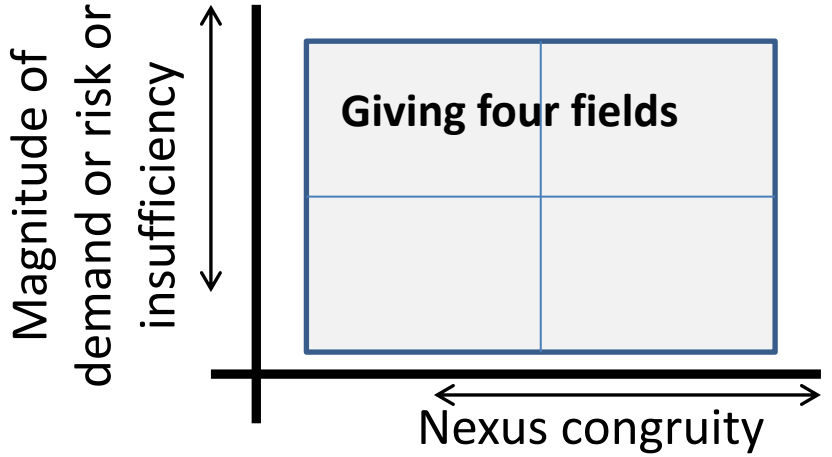


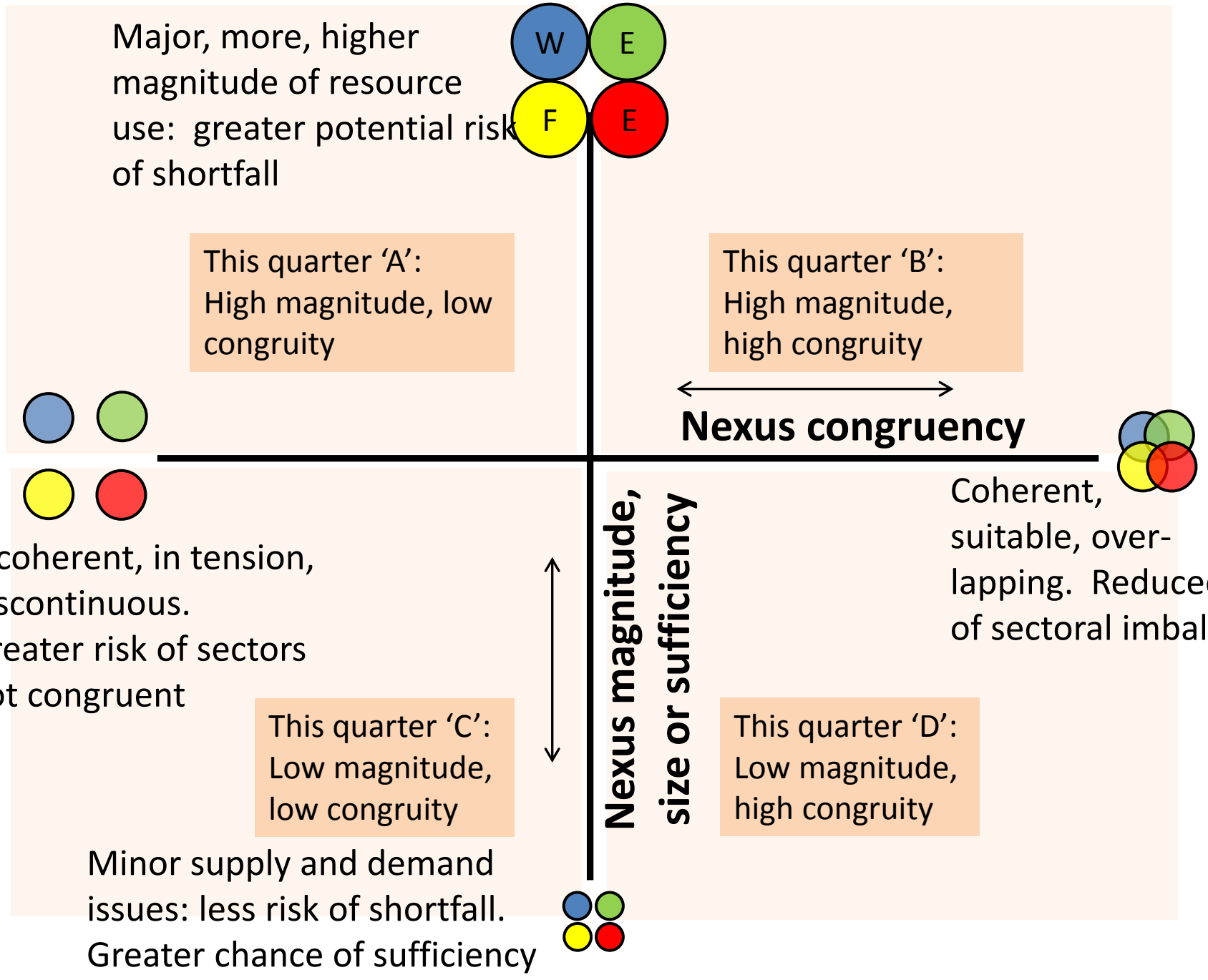
FE²W Nexus magnitude-congruity sustainability framework

The four FE²W sectors are highly interlinked and become more interlinked as demand for outputs and benefits from resources increases. The normative element of this framework suggests that in risky high-demand/high supply conditions, the congruity/fit between the four sectors in this nexus needs to be considered to ensure sustainability and equity

Axis	Definition	Sector	Scale
Nexus demand magnitude and risk	Magnitude of demand-supply sufficiency for nexus sectors offer a measure of the size of nexus risk.	Measured by a variety of supply and demand indicators such as population, power generation, water availability, water consumption, habitat loss, freshwater ecosystems	
Nexus coherence, congruity	A measure of fit between the policies, products and outcomes the water, energy, food and environment sectors	Sectors fit together via measures, policies, production, efficiencies, externalities, or other linkages	National down to local scales fit/do not fit together (with emphasis on poverty?)

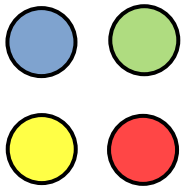





Major, more, higher magnitude of resource use: greater potential risk of shortfall
W
E
F
E
This quarter 'A': High magnitude, low congruity
This quarter 'B': High magnitude, high congruity
Nexus congruency
Incoherent, in tension, discontinuous. Greater risk of sectors not congruent
Coherent, suitable, over-lapping. Reduced risk of sectoral imbalance
Nexus magnitude, size or sufficiency
This quarter 'C': Low magnitude, low congruity
This quarter 'D': Low magnitude, high congruity
Minor supply and demand issues: less risk of shortfall. Greater chance of sufficiency

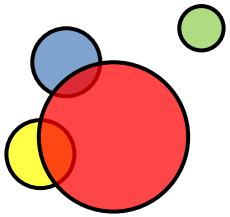
To summarise; how to read the graph and coloured discs

On the previous page, we (as a society) normatively seek to be in Quarter B and D where higher levels of congruity between sectors are being sought and/or delivered. See case studies overleaf for further explanation.



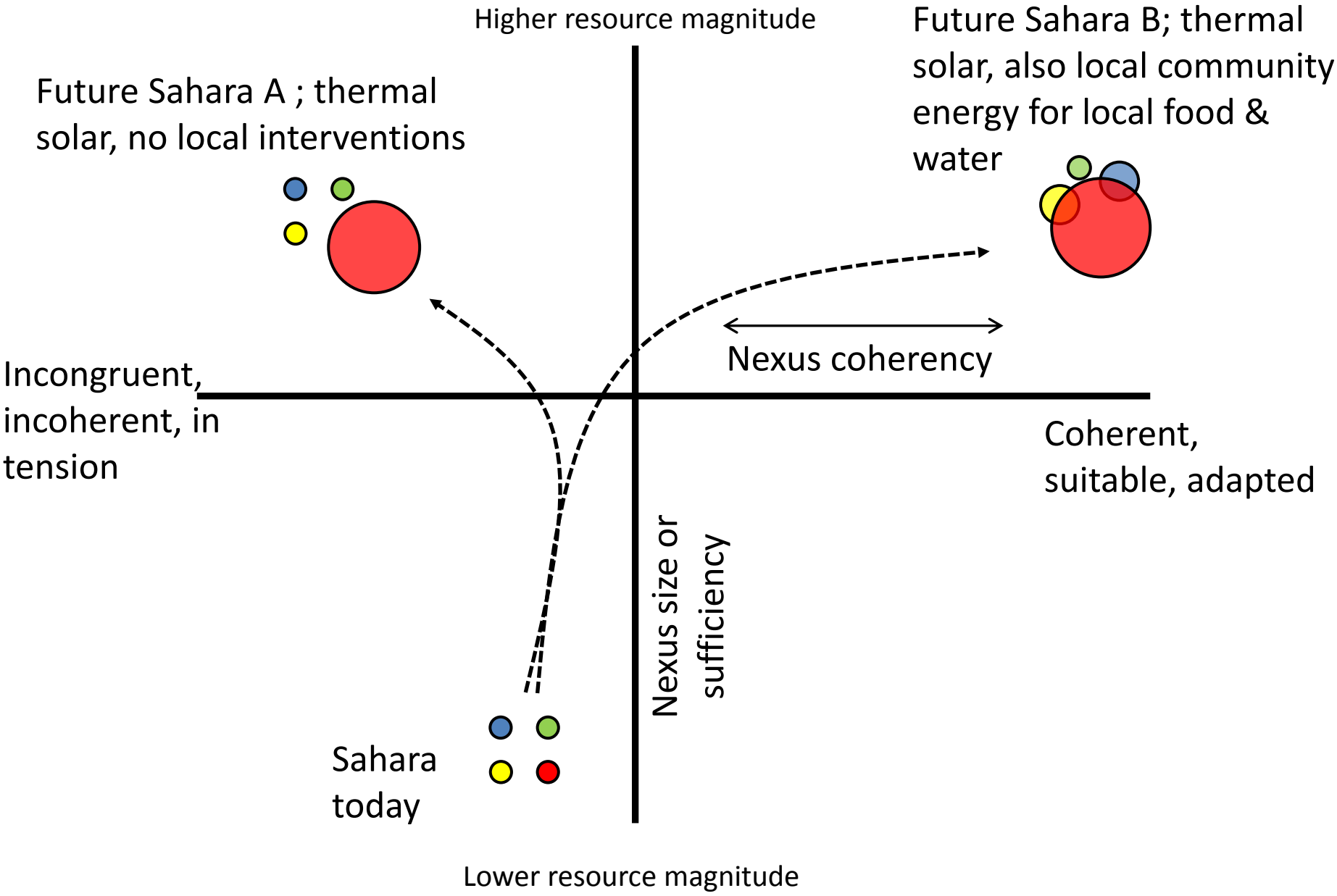
Here, as represented by the coloured discs, the four sectors are some distance from each other – but equally sized. This implies a lack of coherence and connection between the sectors but they are generally in balance.

All four sectors in the nexus are closely connected and working together. Coherent, suitable, over-lapping. There is a reduced risk of sectoral imbalance

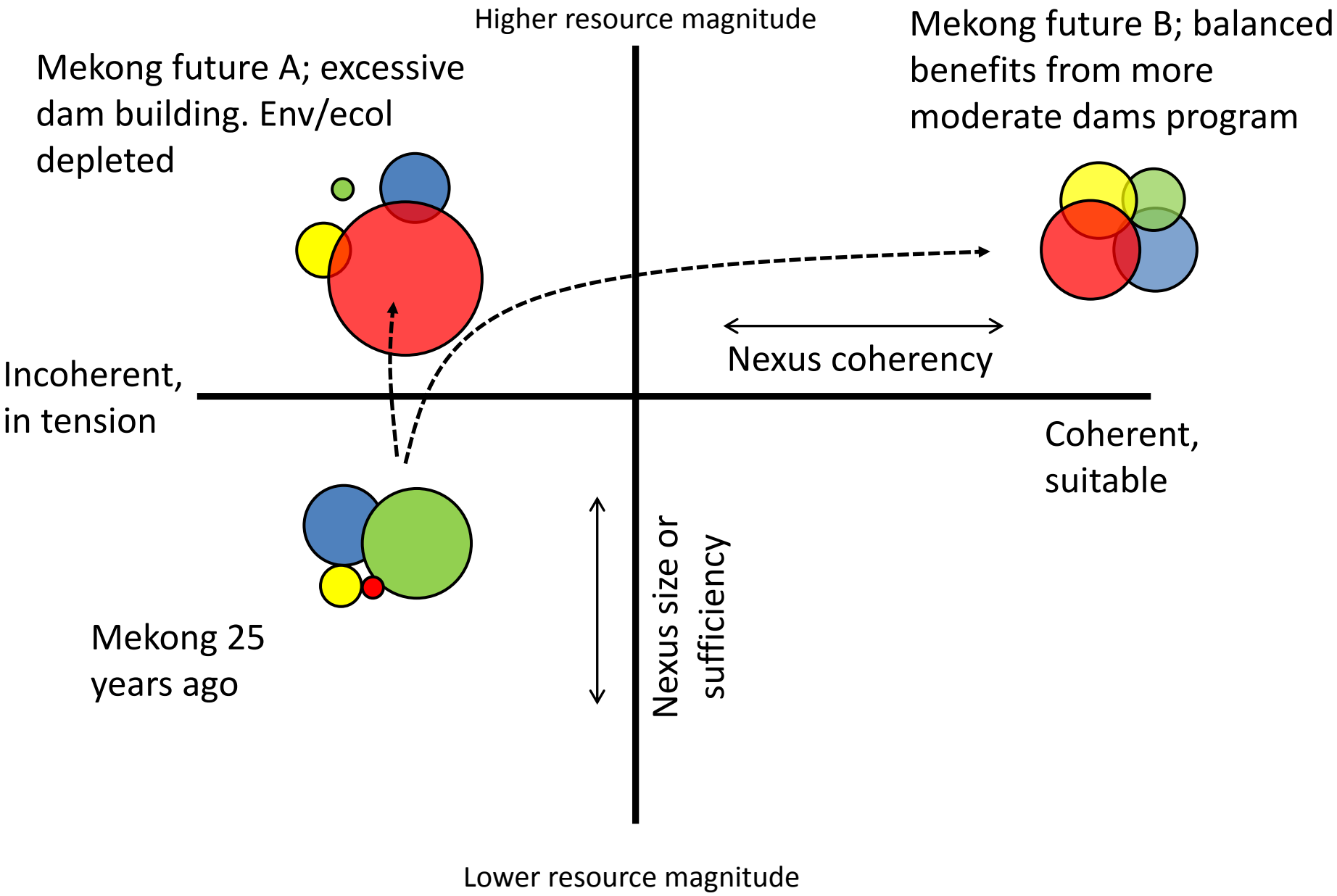


Here the **energy** sector dominates in terms of water use or policy emphasis. Water and food sectors closely connected to the energy sector. The environment is a poor relation and is possibly being omitted or under-served.

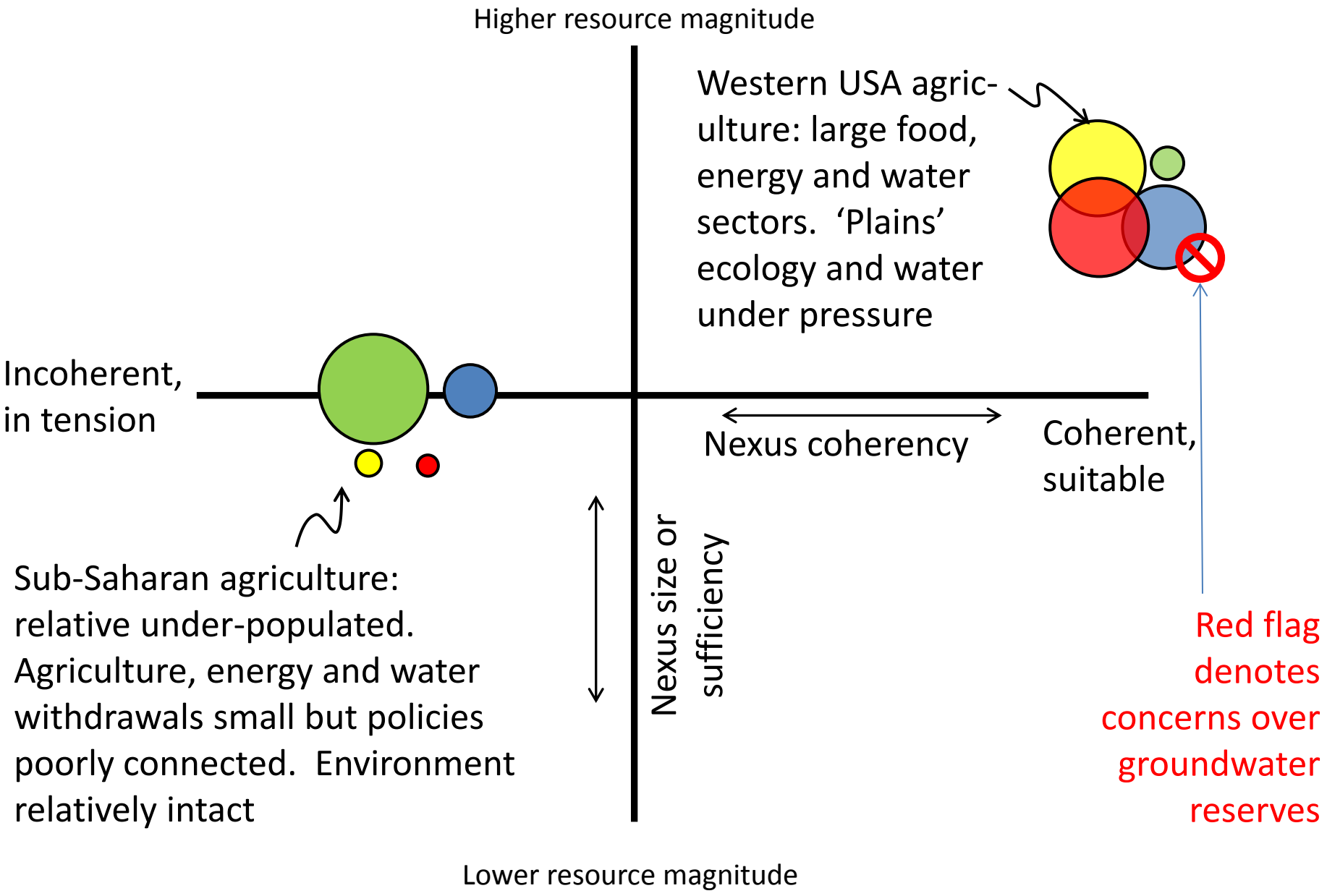
Nexus in Sahara desert; current and two futures based on thermal solar



Nexus in Mekong; past and two futures recognising dam building



Comparing SSA savannah and Western USA groundwater agriculture



Using bubble graphs in Excel?