



Protected Areas: Safeguarding Natural Infrastructure from Impacts of Climate Change

Water and Climate Change in Southeastern Europe Conference
Tirana 24 – 25 June 2008

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Why be concerned?

- PAs are insurance for the most important elements of natural infrastructure and thus sustainable economic and social development
- PAs represent conservation cores and will provide anchors for maintaining biodiversity and ecosystem services under increasingly stressful conditions
- PAs act as « carbon sinks » and thus help mitigate climate change impacts (and can earn carbon funds)
- PAs act as a buffer against extreme weather events (e.g. cyclones and floods; 2006 SE Asia tsunami impacts were less in protected coastal areas)

Protected Areas and Climate Change



- PAs are already being significantly affected by climate change, particularly in mountainous (alpine, glaciers) and marine (coral bleaching) and coastal (flooding, erosion) areas
- Susceptible areas include those in higher altitudes (montane, cloud or dry forests) and latitudes (tundra, boreal forests), as well as drylands, coastal areas and islands
- In Canada, under all climate scenarios, > half of PAs will experience substantial vegetation change
- In UK, estimated that 10% of reserves could be lost in 30-40 years

PA Vulnerability Characteristics



- Possess high edge : area ratio
- Isolated or islands: physically, ecologically
- Have anthropogenic stresses in and around boundaries
- Isolated population pockets and fragmented ecosystems within
- Low management capacity and effectiveness already

PA Vulnerability Characteristics



- **Presence of particularly vulnerable ecosystems or ecosystem components (e.g. water regime dependent, low tolerance range of species to physical parameters)**
- **Presence of species and/or ecosystems at edge of their ranges**
- **Homogeneity (topographic, geomorphological)**
- **Small size**



Implications for PAs

- **Climate change has major implications for the planning and management of protected areas and this must be recognized and acted upon now**
- **There may be adaptation principles that can be applied to buffer protected areas from the impacts of climate change and specific actions that can be undertaken proactively to help maintain their biodiversity conservation values**

PA Adaptation Principles



- **Adapt in anticipation - rather than react after the fact – be proactive vs reactive**
- **Maintain and develop options to maximize ecosystem resilience**
- **Avoid fragmentation and provide for connectivity (establish new corridors or biolinks between PAs)**
- **Strive for “porosity” of landscapes to increase biodiversity dispersal potential and adjust boundaries/zones as needed**

PA Adaptation Principles



- **DO NOT** move PAs to anticipated biomes
- **Protect known/anticipated refugia at all scales**
- **Provide for buffer zones around PAs to adjust PA boundaries if required - flexibility**
- **Strive to maintain natural processes and ecosystem services**
- **Include climate change scenarios in the selection of new PAs and in system planning**

PA Adaptation Principles



- **Protect older forest stands**
- **Support *ex-situ* conservation efforts**
- **Consider assisting species migration where feasible and practical**
- **Invest in restoration with the future in mind**

PA Adaptation Principles



- Pay particular attention to conserving functional groups of species such as pollinators, seed dispersers, predators and Valued Ecosystem Components most threatened by climate change, e.g. plant and animal species that are currently range edge or unique, keystone species/processes
- Adopt a regional scale for PA planning and management (local, regional, trans-boundary) and improve *inter-situ* management
- Involve local communities in strategies
- Use PAs as benchmarks for monitoring and report to decision-makers
- Use adaptive management and strategy testing



PA Adaptation Actions

- **Analyse PAs' vulnerability - undertake national level PA system reviews to determine vulnerability of PAs in countries/regions**
- **Review adaptation options, define strategies, implement actions, monitor, provide feedback and reporting, adjust strategies as required**
- **Adjust system planning on basis of new evidence; also include adaptation in individual PA management plans**
- **Eliminate or mitigate non-climate related threats in PAs as much as possible**



PA Adaptation Actions

- **Identify sensitive biomes/areas**
- **Model biodiversity response to climate change at a regional level with multiple PAs – trans-boundary, coastal and marine as well**
- **Represent vegetation types and gene pools across environmental gradients (latitudinal and altitudinal)**
- **Reduce PAs' own carbon footprint and communicate and educate**



Thank you

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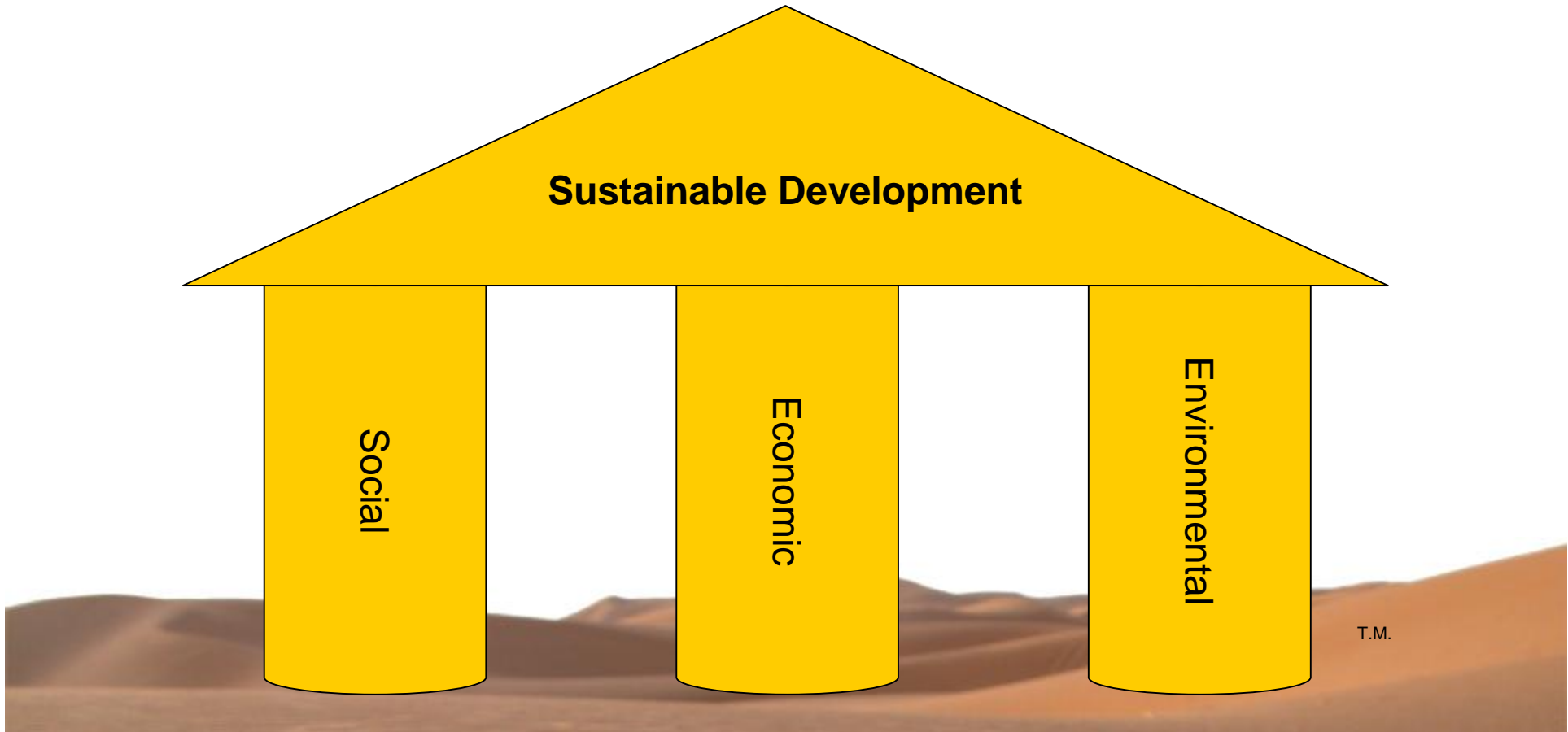
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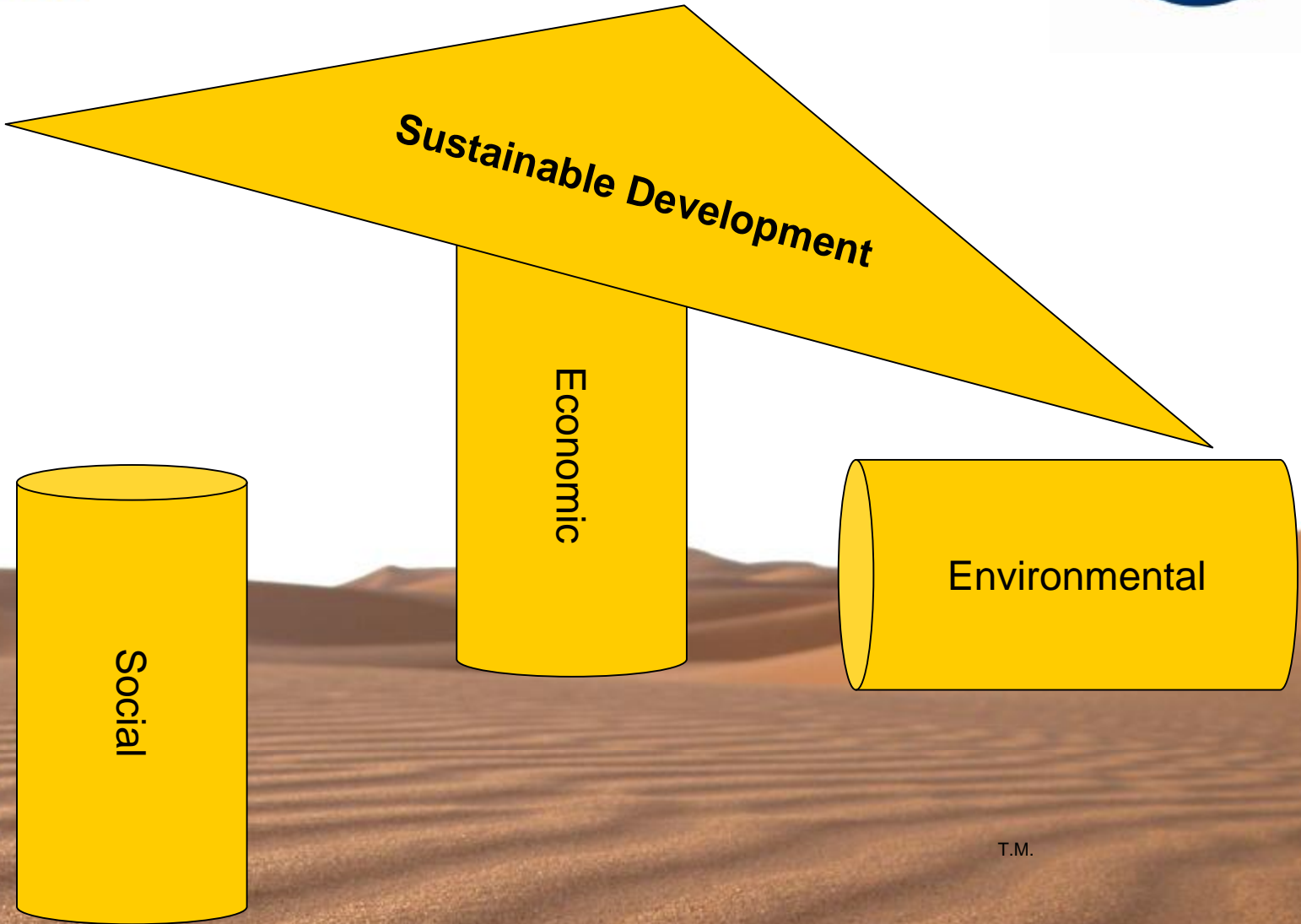
Questions:



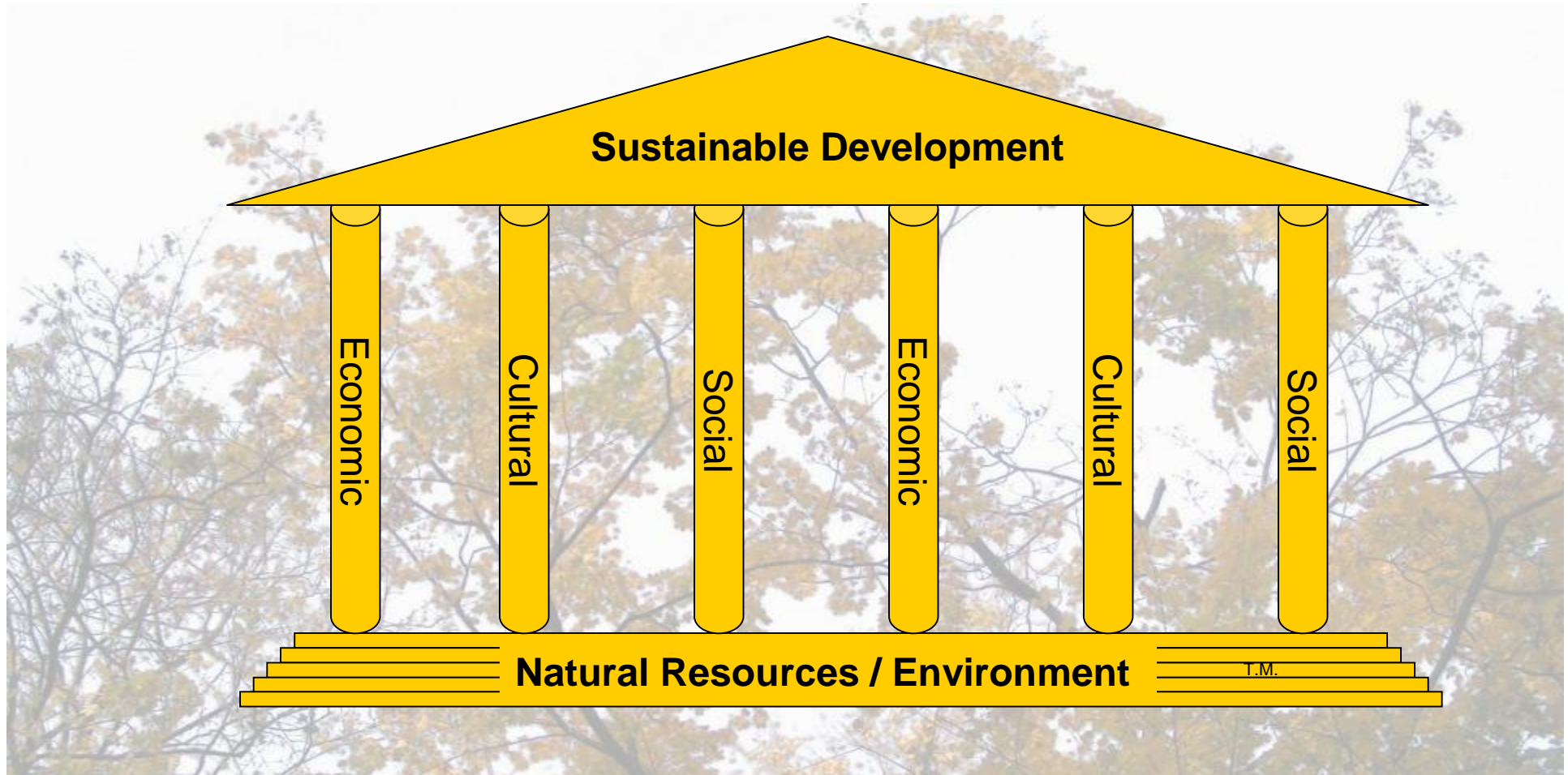
- **Should investment in infrastructure be equally concerned with maintaining natural infrastructure?**
- **What is necessary to maintain the benefits of natural infrastructure for the future?**
- **How can economic or other instruments be best used to include in decision-making the real price of using natural infrastructure and its enhancement and maintenance?**

WRONG





RIGHT?





NATURE MUST HAVE A PRICE!

