environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Environmental Risk Assessment: A Practical Approach

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South Africa is the 3rd most biodiverse country in the world

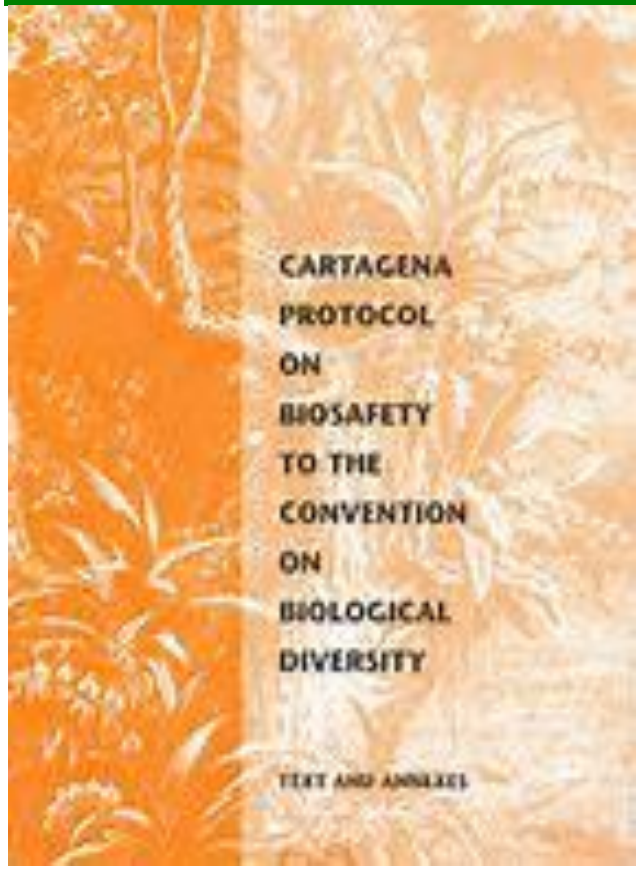
7% of the world's reptiles, birds and mammals

10% of the world's plants

2% of the world's land area

15% of the world's coastal marine species

Background



- Annex III of the Protocol covers tradition 5 step process:
  - Identification of any novel genotypic and phenotypic characteristics
  - Evaluation of the likelihood of adverse effects being realized
  - Evaluation of the consequences
  - Estimation of the overall risk
  - Recommendation
- Guidance introduces new concepts

  Elements of PFOA

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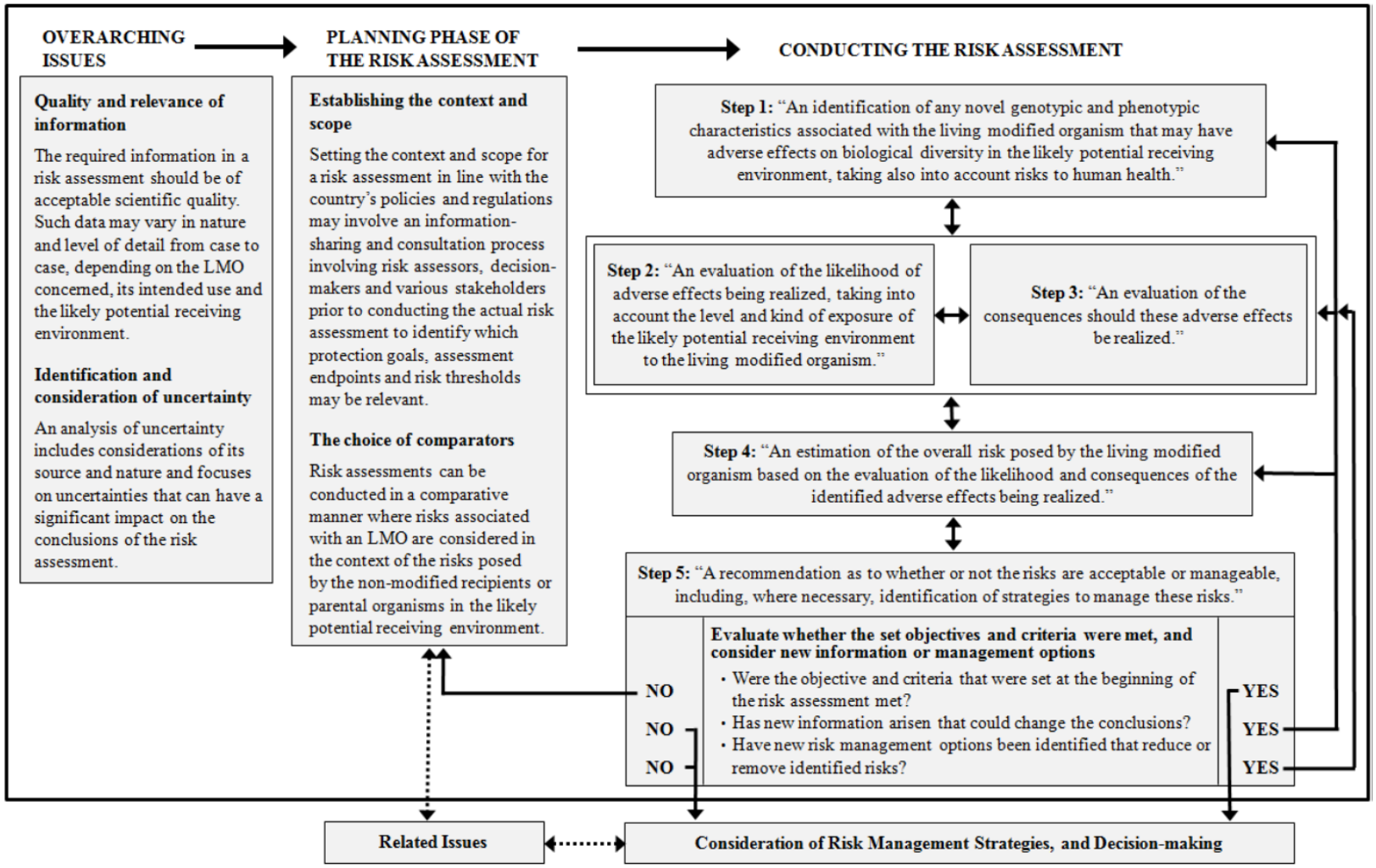
Flowchart in the Roadmap:



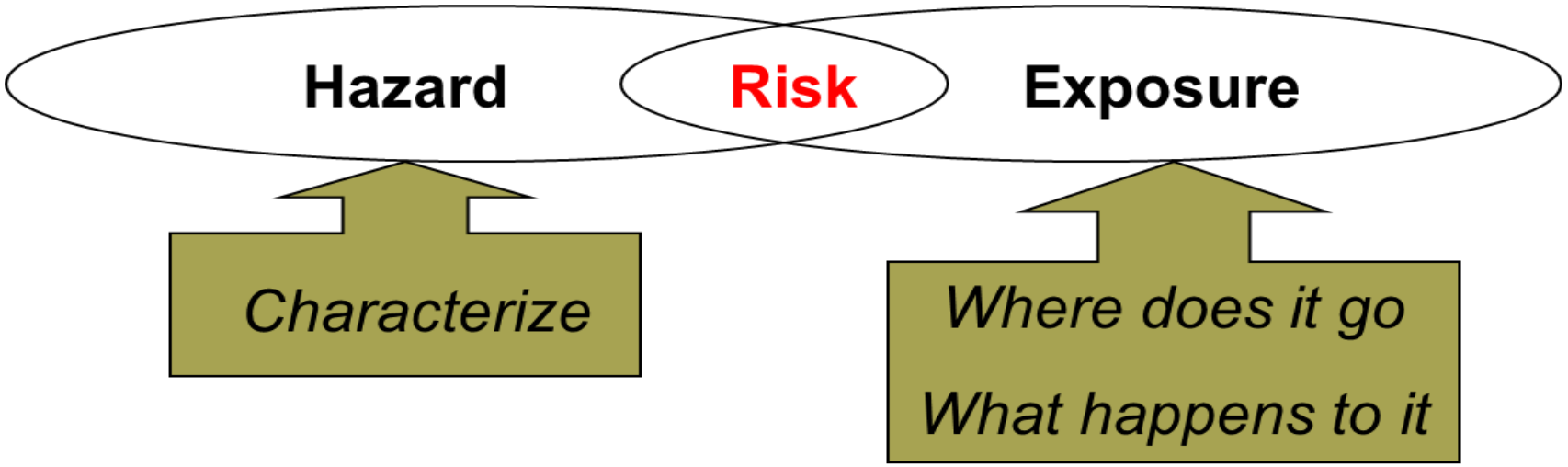
Environmental Legislation, policy and tools identify protection goals

- National Environmental Management Act (1998)
  - Basic principles and EIA provisions
- National Environmental Management Protected Areas Act(1998)
  - Restrictions on land use
- National Environmental Management Biodiversity Act (2004)
  - Monitoring of commercial releases
  - EIA for specific GMOs considered a threat
- National Biodiversity Strategy and Action Plan
- National Biodiversity Framework
- Guidance documents:
  - Environmental risk assessment frameworks for plants, pharmaplants, aquatic organisms

Defining Environmental Assessment end points

- Assessment endpoints - *environmental values that are to be protected (operational)* e.g biodiversity impacts - non-target organisms
- Measurement endpoints - *quantifiable indicator of change in the assessment endpoint, constitutes measures of hazard and exposure* e.g fitness levels
- Determination of Protection goals and endpoints key to problem formulation

Regulatory Approach to Environmental Risk Assessment



Tiered Approach

- Tier 1 – lab studies where non-target organisms are exposed to purified protein (10X the expected environmental concentration) to determine potential adverse effects
- Tier 2 – lab studies using actual plant material (leaves, roots, pollen assays) to determine potential effects on NTOs using environmentally relevant exposure concentrations; could involve multiple trophic levels if applicable
- Tier 3 – long-term lab tests, greenhouse or semi-field studies
- Tier 4 – field monitoring studies

  - Tests proceed to Tier 2 only if results from Tier 1 studies show adverse effect AND if exposure to NTO is probable
  - The tiered approach system is cost effective, minimizes environmental risk

Environmental Risk Assessment is central…..

- Environmental safety assessment takes into account (checklist)
  - the plant's potential to become a weed or to invade natural habitats
  - the potential consequences of gene flow to related species
  - the potential for the plant to become a plant pest
  - the potential impact on non-target organisms, including humans
  - the potential impact on biodiversity
  - Changes in agricultural practices

Environmental Risk Assessment is central…..

- Other environmental considerations:
  - Wetland delineation
  - Species identified for which this a breeding ground
  - TOPS and protected species, IUCN red data list
  - Map of sensitive areas
  - Map of CBAs from Bioregional Plan and Provincial Biodiversity Conservation Plan
  - Listed Ecosystem map
  - NPAES
  - Vegetation map

Practical considerations

- Non-target organisms species selection criteria for Arthropod biodiversity study
  - Indicator species
  - Representatives of functional group
- Weediness potential
  - AIS Regulations and risk assessment framework
- Gene Flow
  - BGIS maps
  - Natural distribution maps
  - TOPS lists

ENVIRONMENTAL PROTECTION GOALS

- Environmental Protection Goals - broadly defined and valued environmental outcomes
- Choice of protection goals informed by national policies and legislation as well as globally and agreed upon standards
- Expression of the environmental value to be protected
- Well defined in SA context



Conclusions

- GM crops play significant role in SA agricultural productivity
- Key drivers of biodiversity loss:
  - Land use change
  - Alien and invasive species
  - Climate change
  - Species loss/unsustainable use
- Uncertainty still remains
  - Tolerable levels of impact
  - Species and ecosystem types conservation status
  - Ecosystem goods and services
- ERA is an iterative, case by case process underpinned by science

THANK YOU

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