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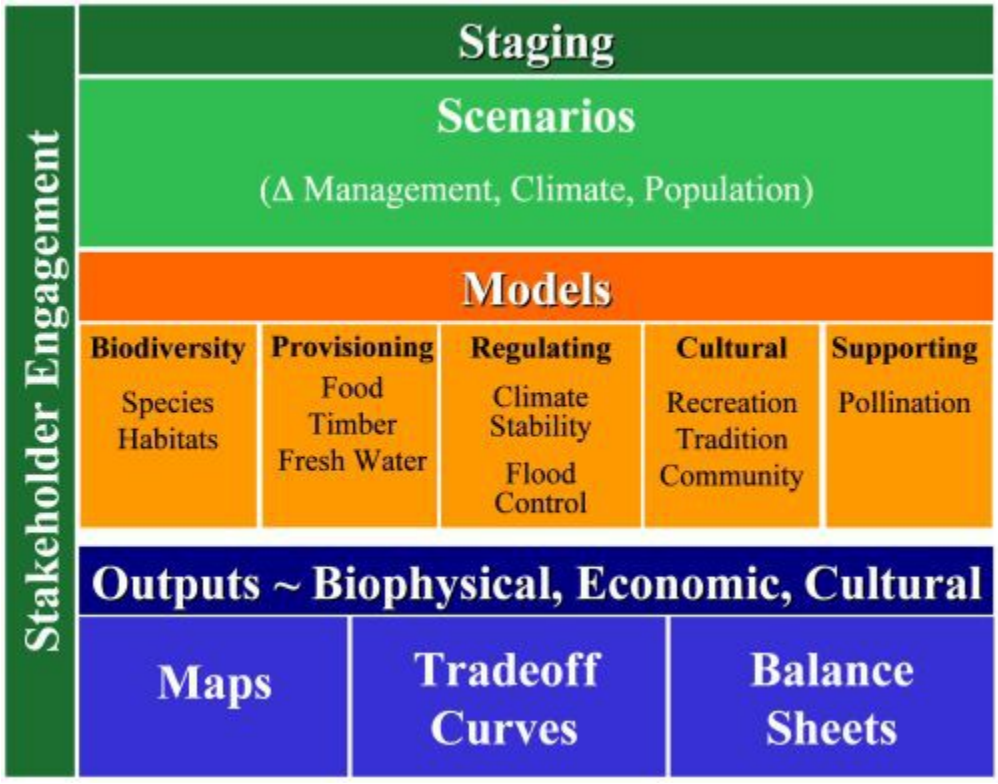
# Developing the TVM Framework

# Mapping Natural Capital into the TVM 7D Framework

InVEST is a planning tool that has been developed by The Natural Capital Project over the past few years.

The following is a schematic that describes the InVEST planning tool that has been developed by The Natural Capital Project.




It is not self evident how this framework works., I am in awe of the science that is 'behind' the work done by The Capital Project in the development of InVEST but concerned that the value of this amazing work is compromised in the end by the lack of integration into a bigger and very rigorous framework of socio-economic and natural capital analysis. This is, of course, what TVM is seeking to develop.

In the InVEST documentation, it states that InVEST can help answer questions like these:

- Where do ecosystem services originate and where are they consumed?
- How does a proposed forestry management plan affect timber yields, biodiversity, water quality and recreation?
- What kinds of coastal management and fishery policies will yield the best returns for sustainable fisheries, shoreline protection and recreation?
- Which parts of a watershed provide the greatest carbon sequestration, biodiversity, and tourism values?
- Where would reforestation achieve the greatest downstream water quality benefits while maintaining or minimizing losses in water flows?
- How will climate change and population growth impact ecosystem services and biodiversity?
- What benefits does marine spatial planning provide to society in addition to food from fishing and aquaculture and secure locations for renewable energy facilities?

These are the 'words' that are included in the 'map' of the InVEST process

Staging
Stakeholder engagement

Scenarios
- Management
- Climate
- Population

Models
- Biodiversity
  - Species
  - Habitats
- Provisioning
  - Food
  - Timber
  - Fresh water
- Regulating
  - Climate stability
  - Flood control
- Cultural
  - Recreation
  - Tradition
  - Community

Supporting
Pollination

Outputs
Biophysical
Maps
Economic
Tradeoff curves
Cultural
Balance sheets

The TVM 'map' is based on the idea that that society and the economy are part of a very large complex dynamic system with space and time integral parameters of the system.

The TVM 'map' also embraces the idea that everything matters and is part of the system. In the high level view there are three segments of the system:

- People: what they need, what they contribute, what they have
- Planet: its natural resources, its living systems, its environment and eco-services, the solar energy, etc.
- Man built structures and systems: Comprising everything that man has created since the beginning of time to improve quality of life … physical things, knowledge, governance, etc.

The TVM approach considers everything from the perspective … derived from nature, from engineering, and from conventional accountancy … that everything must be looked at from the perspective of both flow and state. Using this construct:

- At any time there is a state …
  - At the start of a period the state is state n
  - At the end of the period the new state is state n+1
  - Progress is the difference between state n+1 and state n
- In order to get from state n to state n+1 there have been flows and there has been process.
  - There are flows that result in positive outcomes
  - At the same time there are flows that have negative impact
  - The relationship between the positive and the negative is a function of process

- People: what they need, what they contribute, what they have
  - Needs
    - Need food
    - Need water
    - Need clothes
    - Need shelter
    - Need healthcare
    - Need education
  - Contribute

        - Contribute time
        - Contribute human energy
        - Contribute knowledge
        - Contribute skills
    - Have
        - Have money
        - Have stuff
        - Have knowledge
        - Have education
        - Have health
        - Have family and friends
        - Have faith
    -
- Planet: its natural resources, its living systems, its environment and eco-services, the solar energy
    - Inflows
        - Solar energy
        - Rain
        - Natural life reproduction
        - CO2e sequestration
        - Water processing (natural pollution remediation)
        - Bio system services
    - Outflows
        - Resource mining
        - Energy (coal, oil, gas) extractions
        - Water (from non-renewable aquifers)
        - Bio diversity degradation
        - Atmospheric degradation
        - Land degradation
        - Water degradation
    - State
        - Land and land use
        - Water and water use
        - Atmosphere and use of atmosphere
        - Natural systems and use of natural systems
        - Resources (minerals, etc)
        - Resources (energy … coal, oil, gas, etc)
- Man built structures and systems:
    - Provide goods and services
        - Physical structure … buildings
        - Physical structure … bridges, highways, railroads, ports, etc
        - Industrial products … automobiles, household durable goods
        - Energy … fuel for transport, fuel for buildings, fuel for processes

        - Governance … rule of law, regulations,
        - Knowledge
        - Culture and traditions
        - Systems for recreation … sports, tourist destinations, etc
        -
    - Financial costs and impact issues
        - Physical structure … buildings
        - Physical structure … bridges, highways, railroads, ports, etc
        - Industrial products … automobiles, household durable goods
        - Energy … fuel for transport, fuel for buildings, fuel for processes
        - Governance … rule of law, regulations,
        - Knowledge
        - Culture and traditions
        - Systems for recreation … sports, tourist destinations, etc
        -
    - State
        - There is the historic cost of all these things
        - There is the replacement cost of all these things
        - There is a cost of providing equivalent goods and services a better way
        -

Another way of thinking about the segmentation of everything is to think in terms of 'capitals'. Modern financial planning has an understanding of capital that should be integrated into the TVM mapping of the everything and in turn the TVM analysis should provide decision making scenarios that reflect impact on the various capitals.

Nature and the natural bounty becomes

NATURAL CAPITAL (NC)

Man made structures and constructs becomes

PHYSICAL CAPITAL (PC)

INSTITUTIONAL CAPITAL (IC)

KNOWLEDGE CAPITAL (KC)

FINANCIAL CAPITAL (FC)

People becomes

HUMAN CAPITAL (HC)

SOCIAL CAPITAL (SC)

In the TVM framework, there is a clear distinction between flows and state. This is reflected in accounting and financial analysis as the profit and loss account (flow) and the balance sheet (state). Economics is less clear about this, and in one of the most important measures in economics … the GDP (Gross Domestic Product) … uses a measure of 'flow' to be an indicator of the 'state' of the economy. In common use 'more' GDP is meant to indicate a 'better' state of the economy.

This bathtub analogy should make this clear: The question 'How is the bathtub?' cannot be answered by saying the flow into the tub is 5 gallons a minutes. This is a good situation when the tub is nearly empty, but not a good situation when the tub is about to overflow. The answer should be something like 'nearly full', a true measure of its 'state'.

In TVM the priorities are to optimize:

1 … for people … to maintain and improve quality of life;

2 … for nature and natural bounty … to minimize depletion, damage and degradation;

3 … for man made structures and constructs … to use them in the best way for (1) and (2).

The present situation seems to have the following characteristics:

1 … for people … the quality of life for most people is way below what it should be and could if the system was a whole lot less dysfunctional;

2 … for nature and natural bounty … the depletion, damage and degradation is way above what is should be and could be and is not sustainable;

3 … for man made structures and constructs … these have been optimized to increase financial capital without paying much attention to the impact on everything else.

If you 'manage what you measure', then it is easy to understand how it is that we have the results we have in our global socio-economic system. We only measure progress and performance in terms of money and almost exclusively in terms of impact on FINANCIAL CAPITAL. Furthermore, the only perspectives that are used in measuring performance are those that relate to the corporate organization, specifically the profit and stock value and those that relate to national macro performance, specifically the GDP growth or not.

There is a massive amount of detail scientific work and academic analysis of all sorts of other very important issues, but, as a practical matter, this work does not get integrated into the progress and performance measures that are used every day by people that formulate policy and make major strategic decisions.

KNOWLEDGE CAPITAL (KC) is very large today compared to what KC has been in the past.