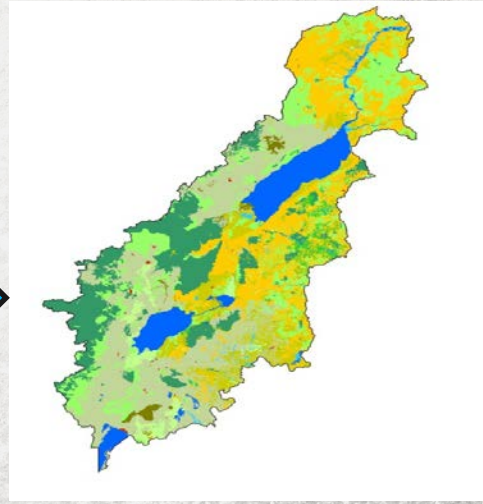
InVEST SCENARIO GENERATOR

INVEST SCENARIO GENERATOR TOOL

- Simple, rule-based software
- Add rules to translate storylines to maps
- Only requires one land-cover map

Land Cover Types	Change	Rules
Broadleaved tree plantation	increase	along roads, in poor soils, on hilltops, difficult to cultivate areas, in and around cfrs & lfrs,
Coniferous plantation	increase	along roads, in poor soils, on hilltops, difficult to cultivate areas, in and around cfrs & lfrs,
Tropical high forest	increase	in and around cfrs and lfrs, not in nps
Degraded forest	decrease	in and around cfrs and lfrs, not in nps
Woodland	increase	outside pas

?



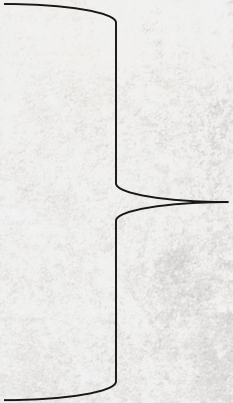
OBJECTIVES AND LAND COVER

- Examples of objectives are:
  - Agricultural development
  - Conservation
  - Urbanization

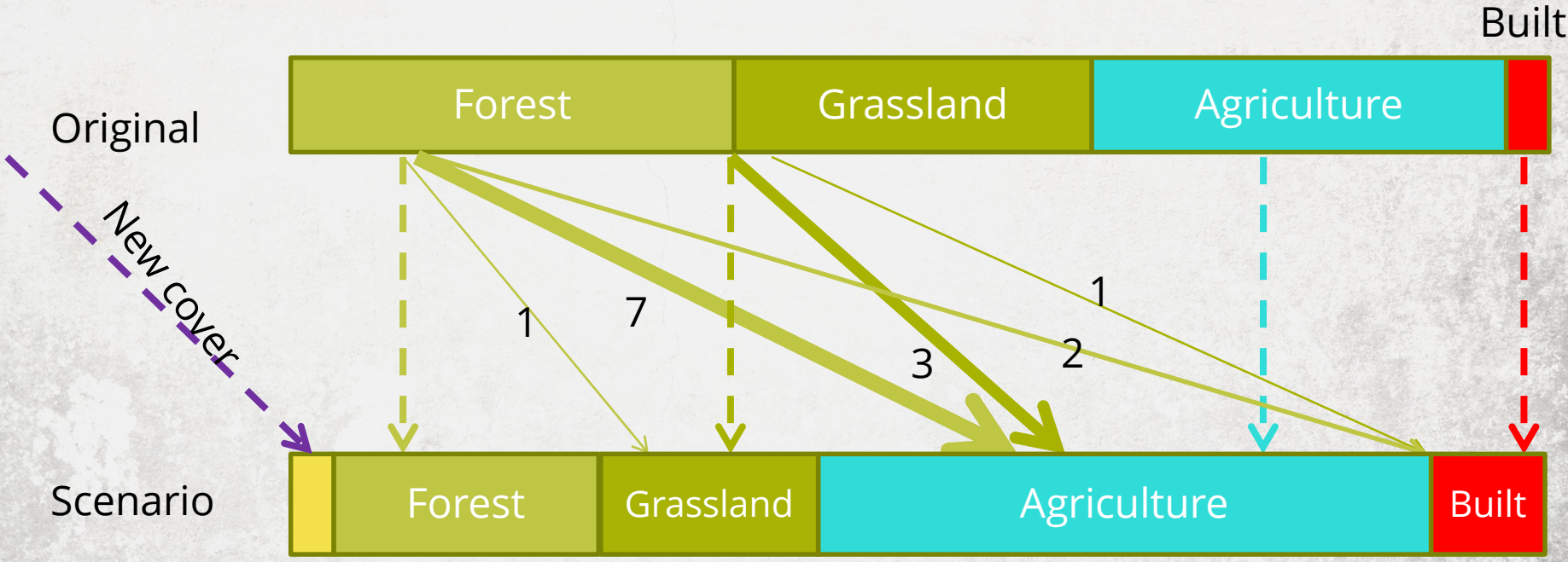
- In this tool, the cover type is used as a proxy for the objective. Cover types that increase represent some objectives

FACTORS

- Proximity and other factors determine where change occurs
  - Roads [transportation,]
  - Rivers [transportation, proximity to water]
  - Slope [access, ag suitability]
  - Cities [market, population pressure]



LAND COVER TRANSITION



CONSTRAINTS

- Constraints determine what can or cannot happen in a given area

- Constraints can be…
  - simple (specific areas cannot be affected, e.g., protected areas)
  - or more complex (e.g., minimum area required for large scale agriculture)

THE MATRIX

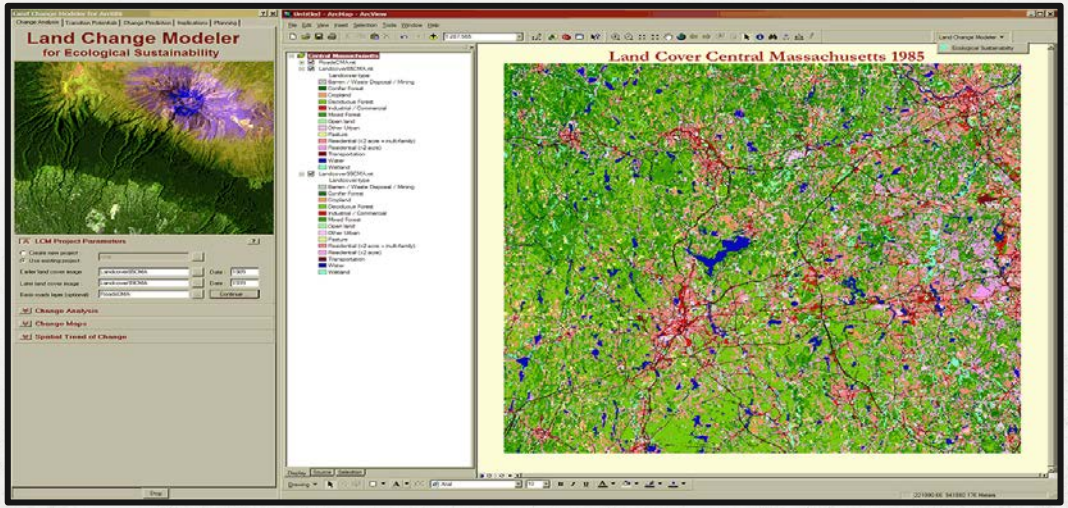
	Forest	Grassland	Agriculture	Urban	Change	Proximity	Proximity Distance	Priority
Forest	0	1	7	2	20%	0	0	0
Grassland	0	0	3	1	10%	0	0	0
Agriculture	0	0	0	0	50	1	10	2
Urban	0	0	0	0	10	1	5	1

Location **Quantity**

CHANGING THE PIXEL

- Process each cover in order of priority
- Calculate quantity of change from % change given in matrix
- Convert pixels starting from suitability values 10 down to 1 until target area change is attained

MANY OTHER LAND CHANGE MODELERS!



Metronamica, PoleStar, IMAGE, WaterGAP, AIM, T21, **GLOBIOM**, Mirage, **CLUE**, GTAP/MAGNET, LandSHIFT, International Futures Model, **IDRISI**, **Marxan**, Dinamica, GEOMOD

LESSONS LEARNED

Include information as part of an iterative, science-policy process

- Define ES and scenario information needed
- Draw on local knowledge
- Create mutual understanding of problem and solutions
- Build trust
- Iterate the process for input and negotiation

Ruckelshaus et al. 2013. Ecological Economics

WHAT ENABLES USE?

- Meaningful participation
- Scenario development
- Integration of local knowledge
- General conditions
  (e.g. established planning process,
  clear decision authorities)

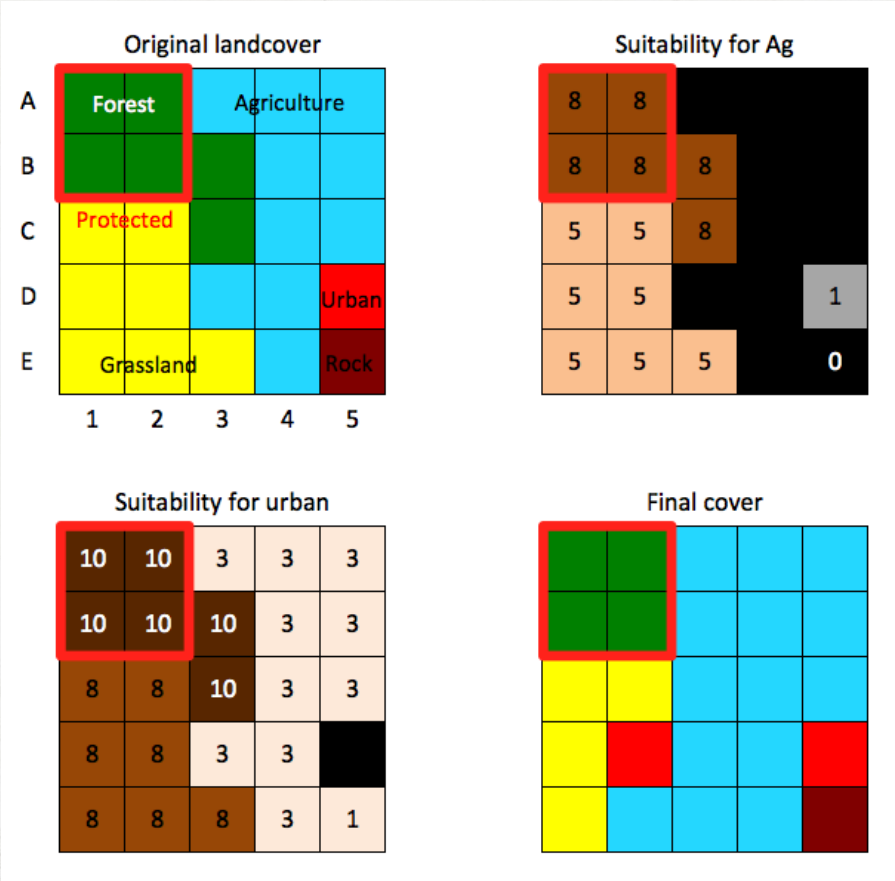
McKenzie et al. 2014, Environment and Planning C

OPPORTUNITIES FOR INTERACTION

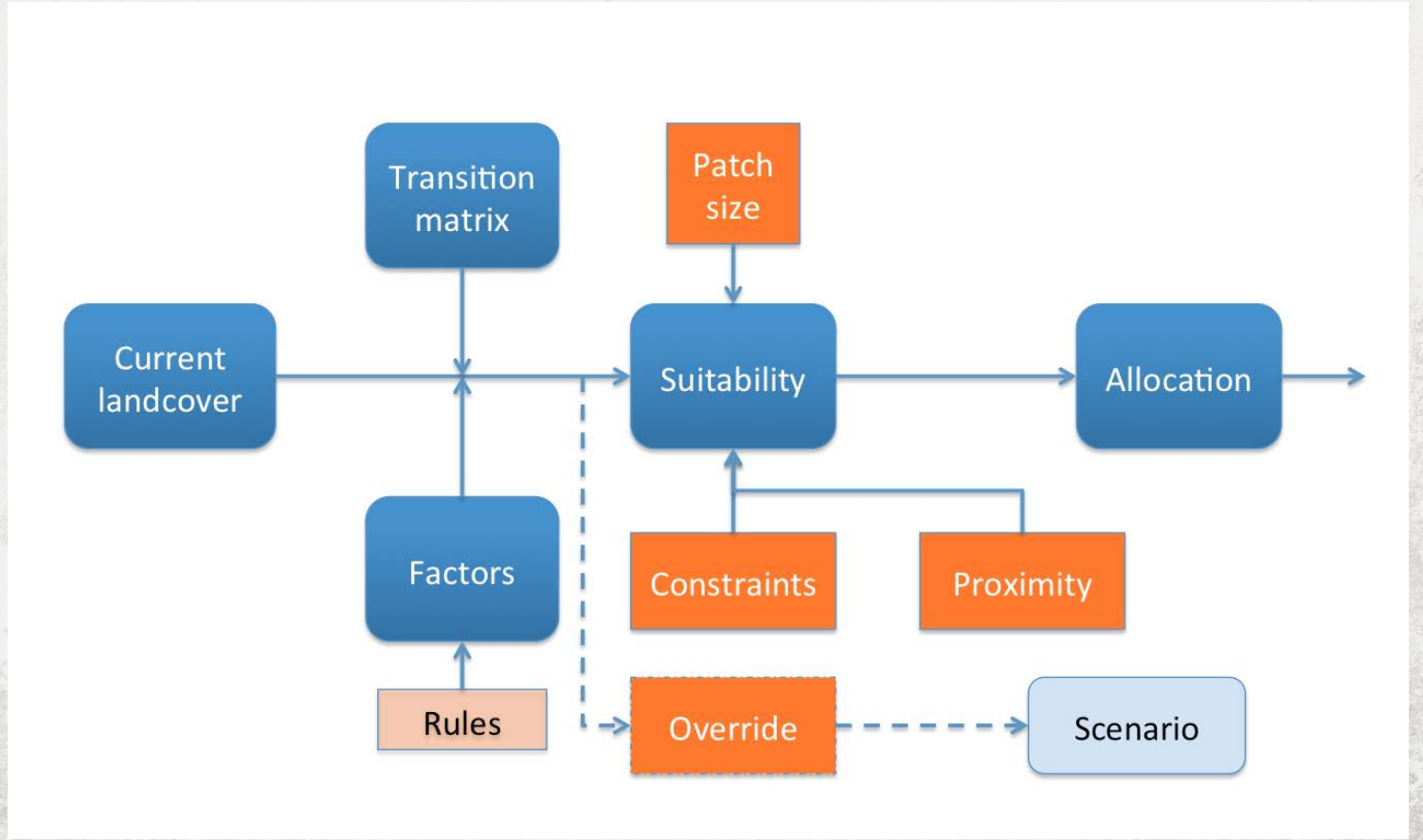
natural capital PROJECT

1. Discussing and defining decision context
2. Developing alternative scenarios
3. Amassing data inputs
4. Interpreting early results
5. ...and repeating as needed!

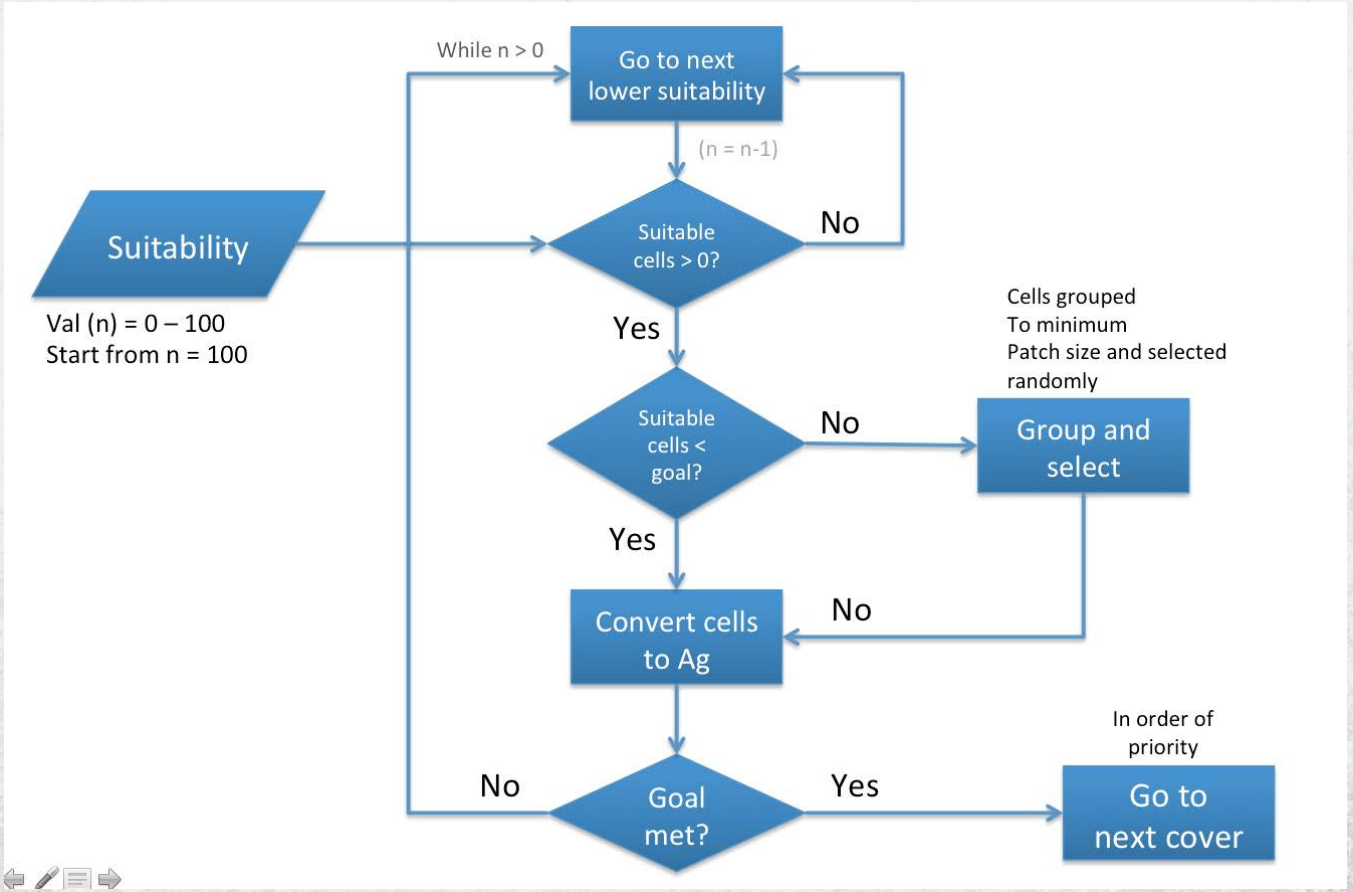
CHANGE


Original landcover
A
B
C
D
E
Forest
Agriculture
Protected
Urban
Grassland
Rock
1 2 3 4 5
Suitability for Ag
8 8
8 8 8
5 5 8
5 5 1
5 5 5 0
Suitability for urban
10 10 3 3 3
10 10 10 3 3
8 8 10 3 3
8 8 3 3
8 8 8 3 1
Final cover

PROCESS


Transition matrix
Patch size
Current landcover
Suitability
Allocation
Factors
Constraints
Proximity
Rules
Override
Scenario

TRANSITION


While n > 0
Go to next lower suitability
(n = n-1)
Suitability
Suitable cells > 0?
No
Yes
Val (n) = 0 – 100
Start from n = 100
Cells grouped To minimum Patch size and selected randomly
Suitable cells < goal?
No
Group and select
Yes
Convert cells to Ag
No
In order of priority
No
Goal met?
Yes
Go to next cover