RESEARCH PROGRAM ON Dryland Systems

iLAMPT - Framework and Tool for Supporting Participatory Adaptive Management

Quang Bao Le

System-based Options by Context

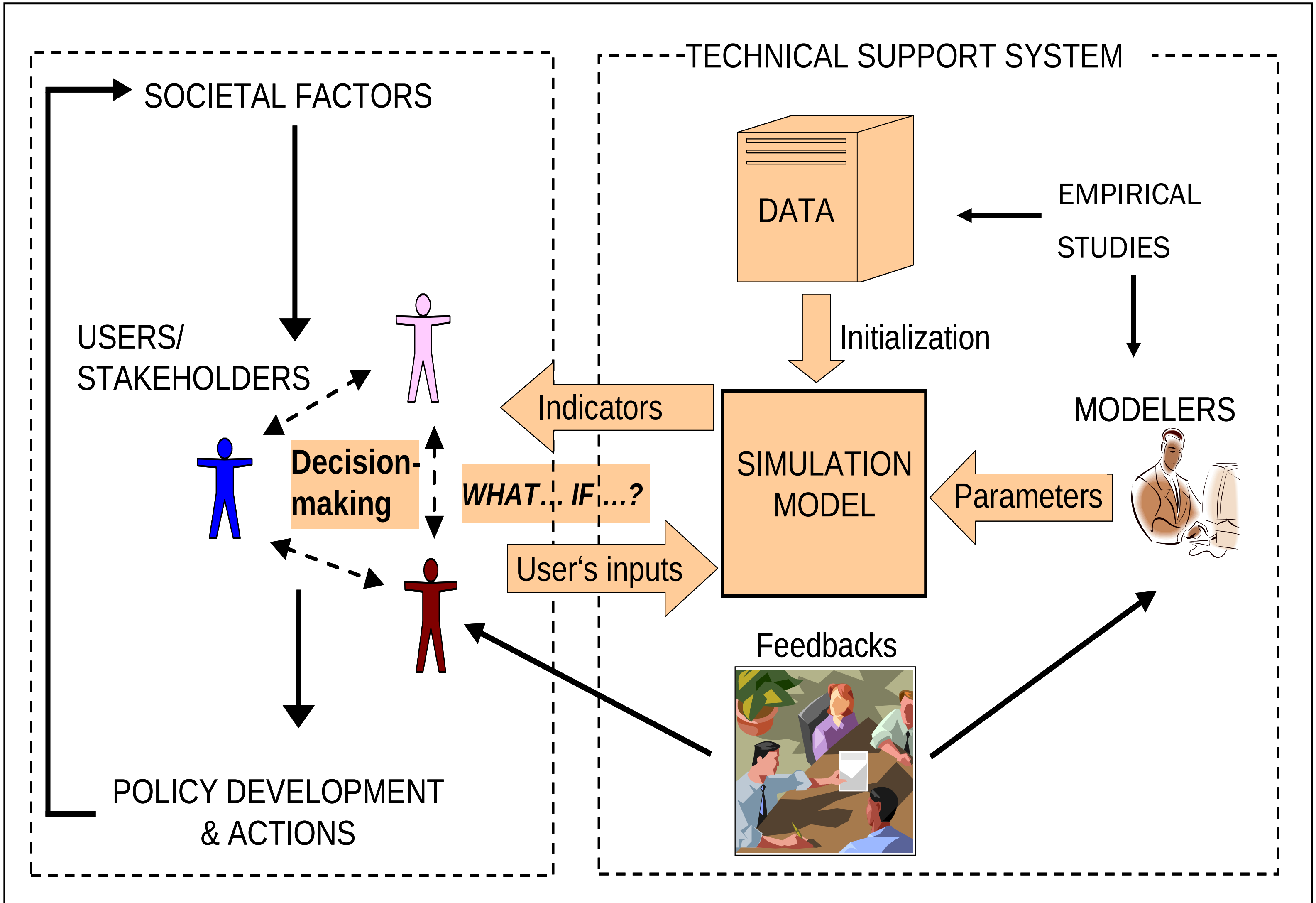
GeOC

A tool for better investment decisions in agriculture and rural development

Projet financé par la GIZ

"Evaluation de l'impact des options de GDT pour l'atteinte de la Neutralité en matière de Dégradation des Terres"

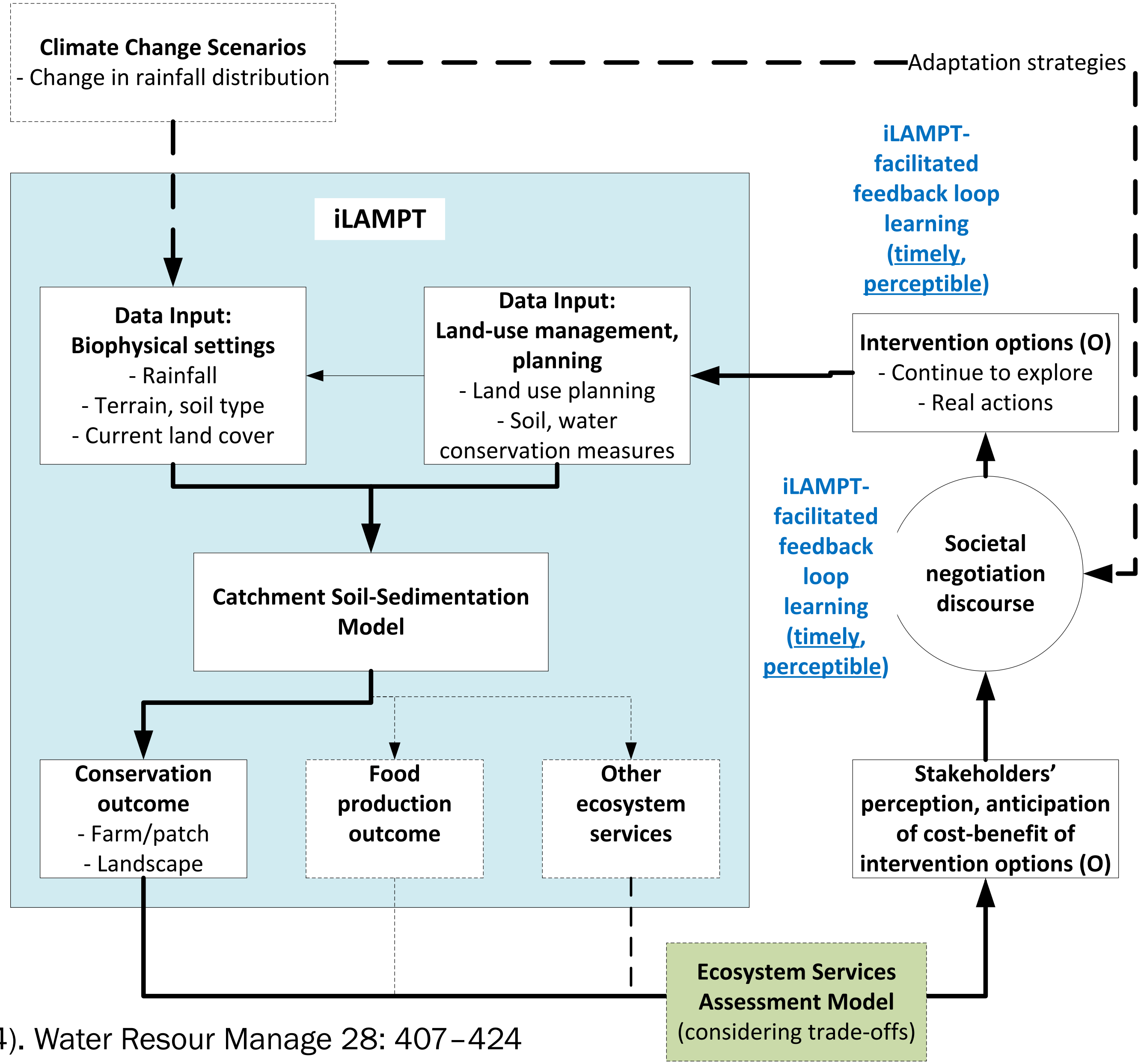
Scientific model as Decision Support System (DSS)



Source: Le et al. (2008, 2010)

A systems strategy for tool-aided adaptive landscape management process

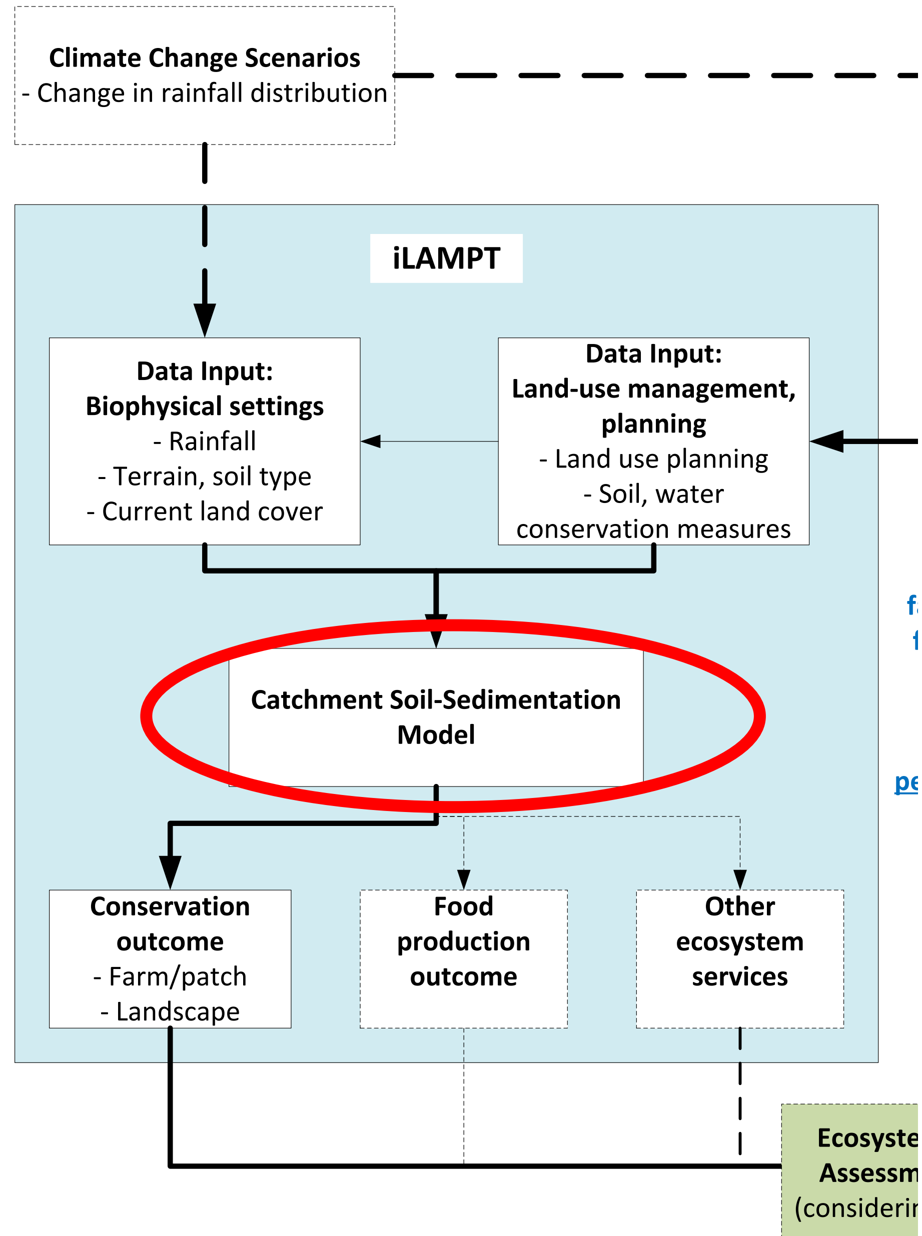
- iLAMPT: Integrated Landscape Management & Planning Tool
- Feedback loop learning in adaptive landscape management supported by iLAMT
- Note: Components with dotted lines are being developed



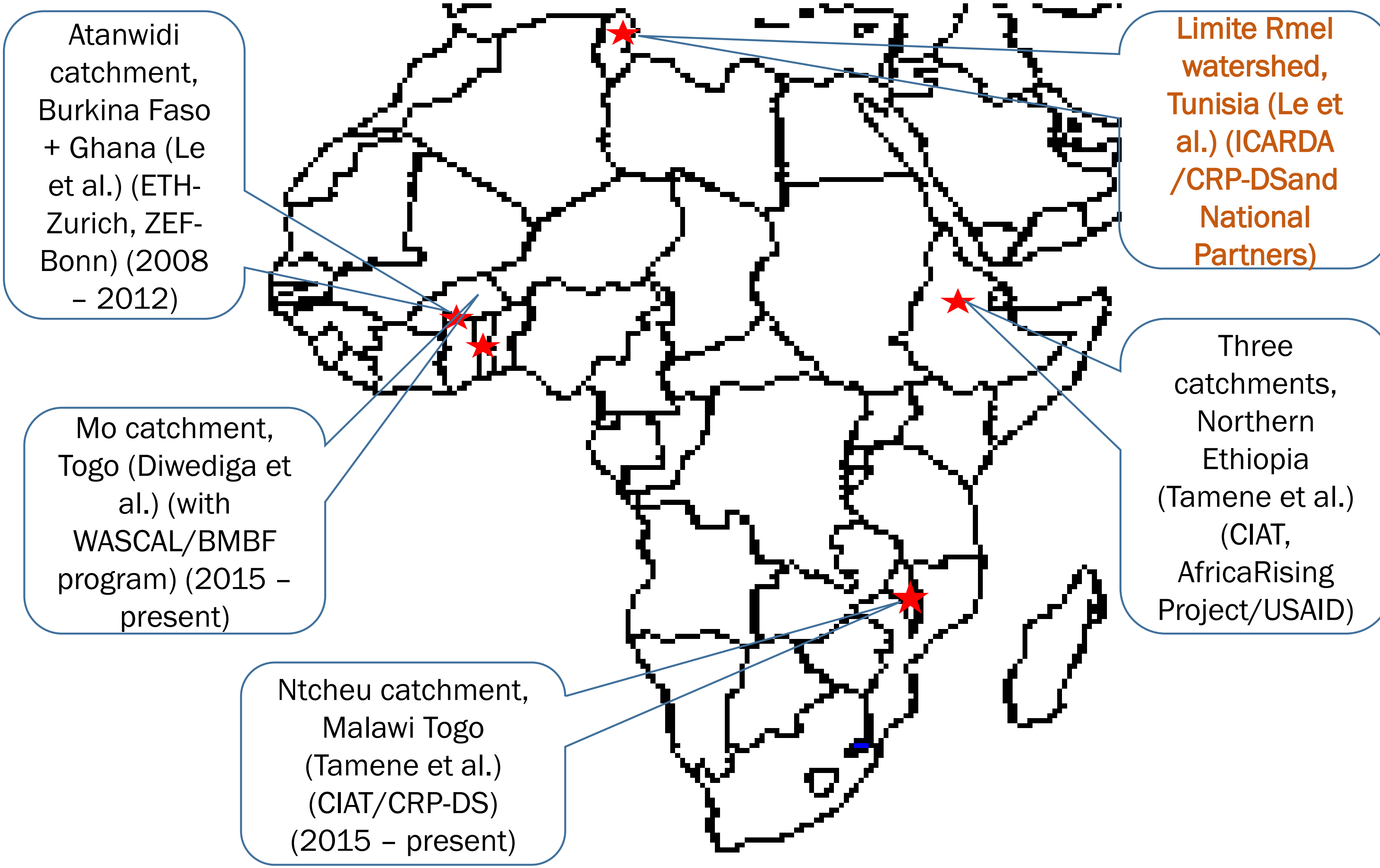
Source: Tamene, Le, Vlek (2014). Water Resour Manage 28: 407–424

Catchment Soil Erosion Sub-model (a core component of iLAMPT)

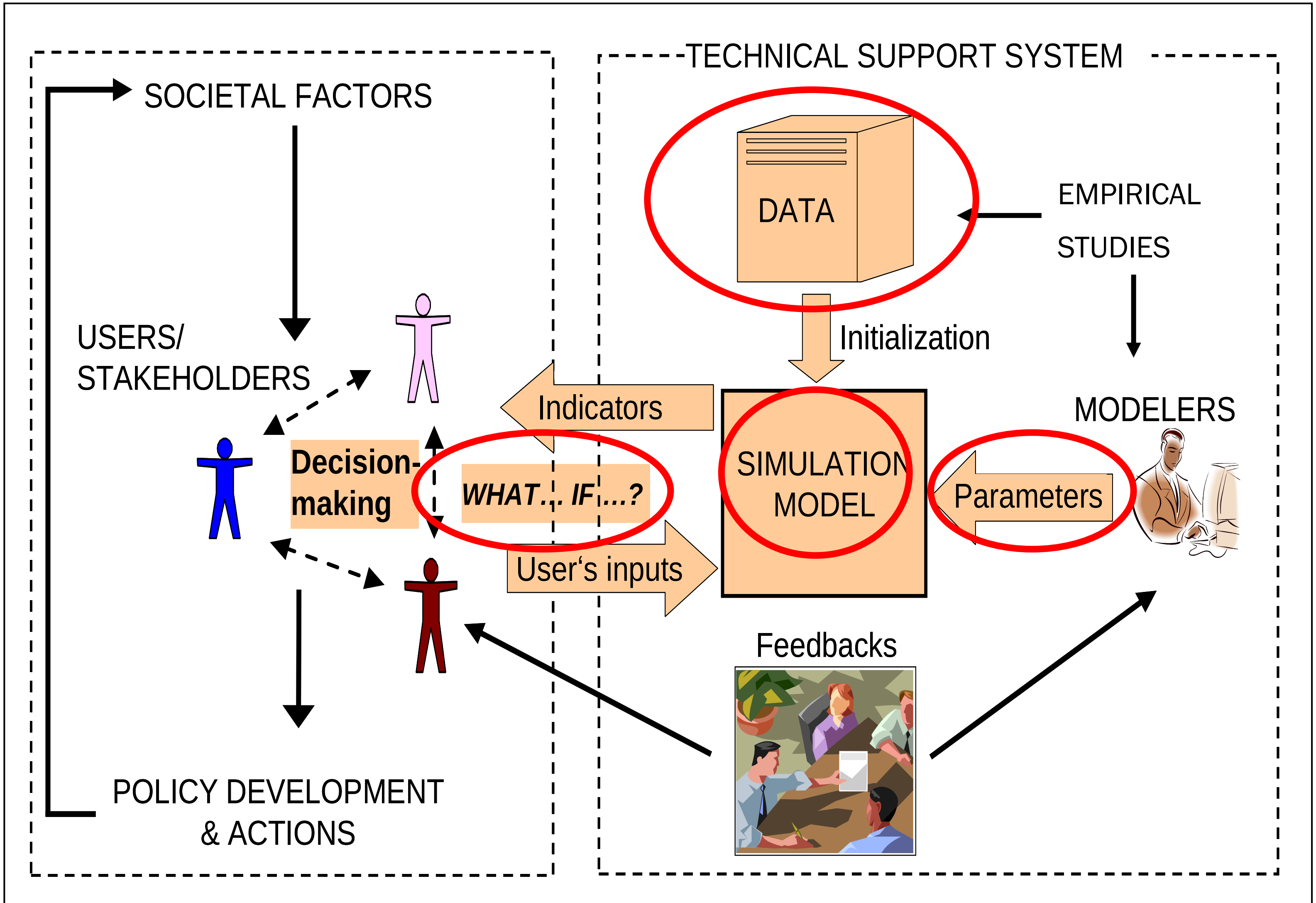
- Revised USLE (traditional)
- Pixel-based Sedimentation Delivering Ratio - pSDR (added)
- Gully delineation algorithm (added)
- User-defined parameter interface (new)
- Ease usage of different data types (new)



On-progress across dryland regions in Africa



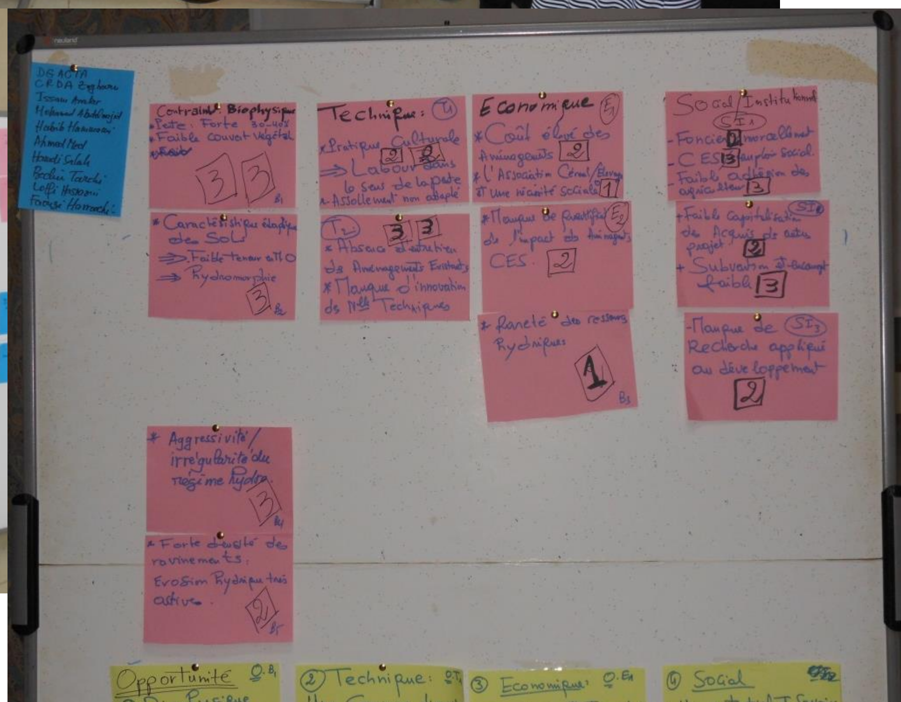
What are needed for iLAMPT?



Source: Le et al. (2008, 2010)

Participatory iLAMPT's Development and Implementation

- **Multi-stakeholders involved:** farmers, managers, policy decision-makers, researchers, educators, etc.
- **Multi-stakeholder workshops** for identifying management scenarios and policy-making issues
  - That will affect the design of the tool
  - That will be assessed by the tool
- **Decision Support practices** by R&D organizations, groups and individuals
  - **Version-by-version** AND **user-oriented** tool development



1. Identifier problèmes et opportunités

Groupes selon « catégorie » (agriculteurs, gestionnaires, chercheurs)

Relations enregistrées et transcrites

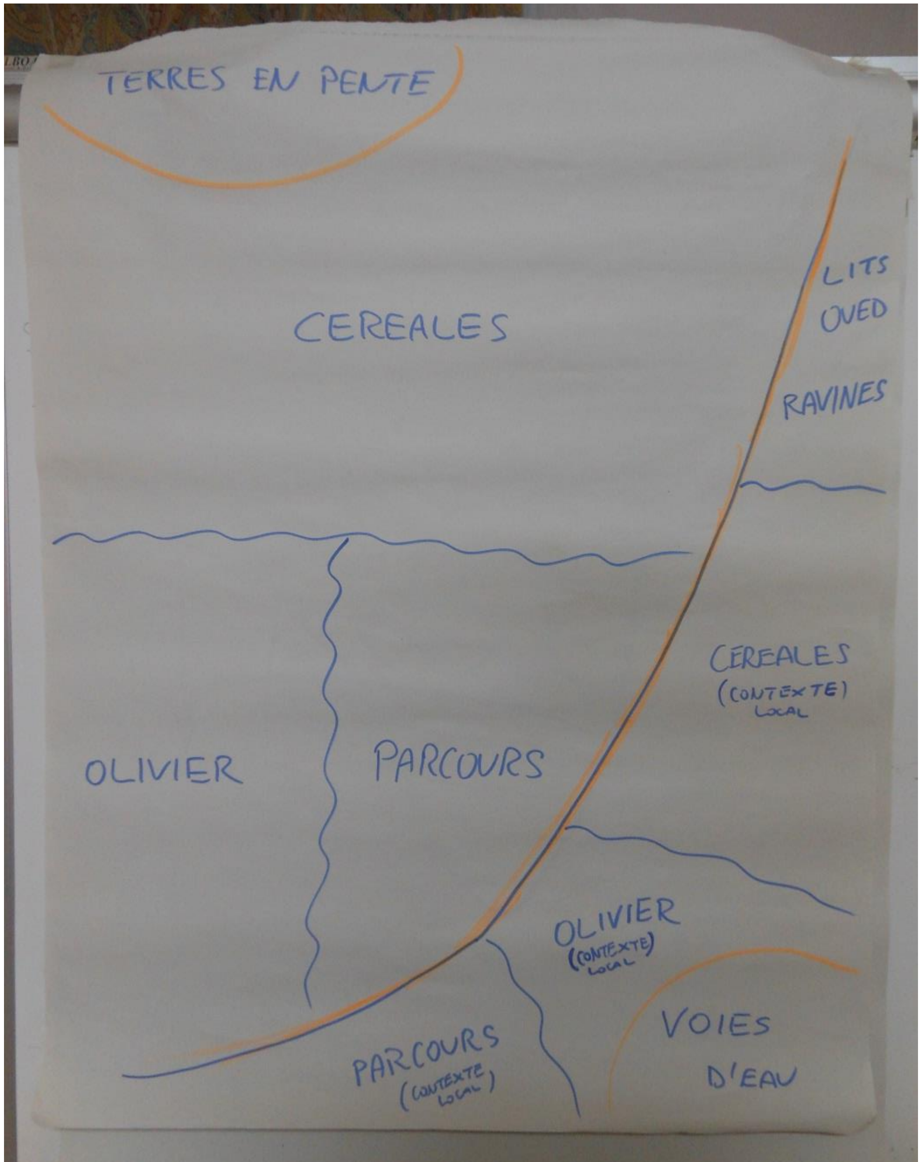
2. Identifier, décrire et évaluer les techniques

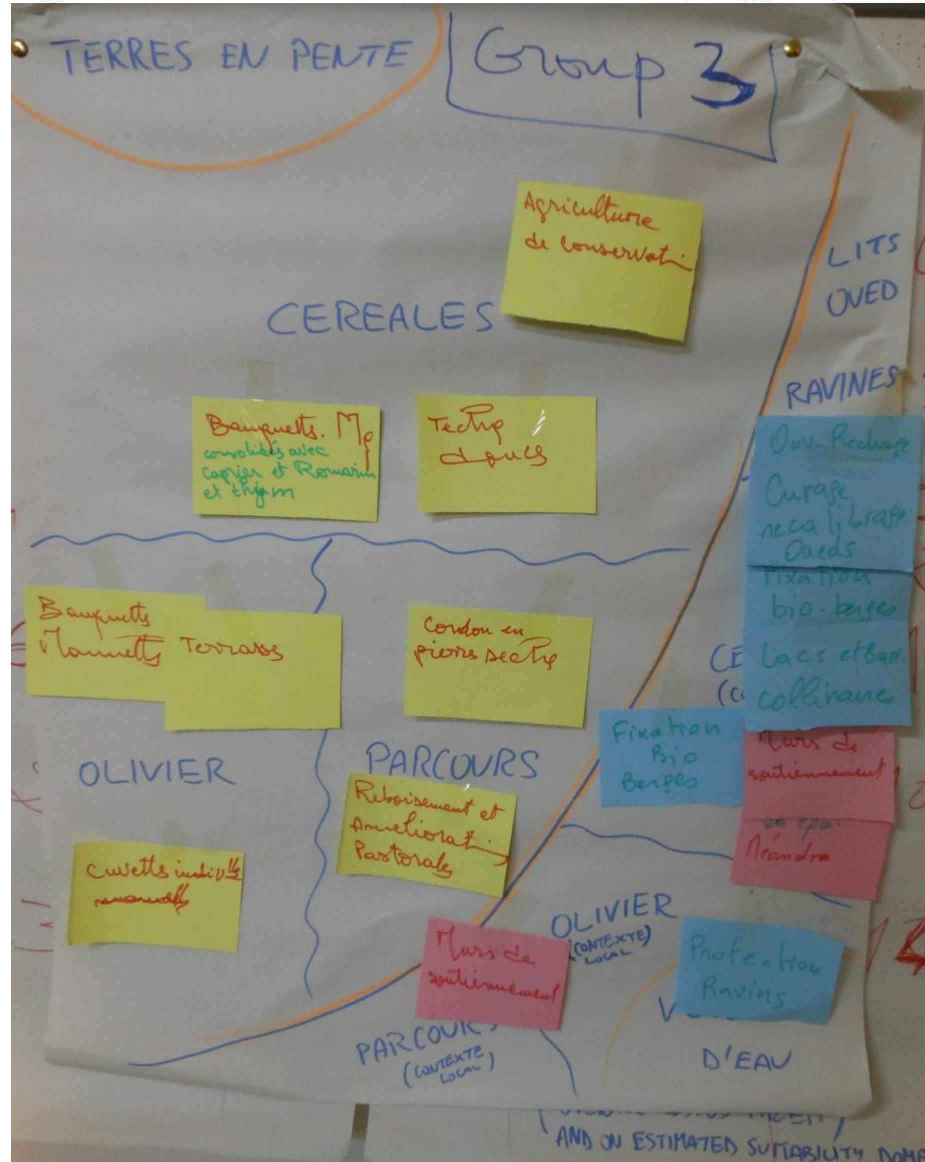
TECHNIQUE CES (MOTS CLES)	LAND USE TYPE	succès	Evidence	Facteurs de succès ou de manque de succès
TERRES EN PENTE				
Banquette mecanique	Cereales, olivier, a pente forte	3		
Banquette manuelle	Olivier (moins frequent, cereales); cas ou intervention mecanique n'est pas possible	3		
Cordon pierre seches	parcours degrades (sol nu, pierreux, en pente)	3		
Technique douce (labour en courbes de niveau, en bandes alternees)	Cereales, a pente faible	1		
Cuvette individuelle, bourrelet terre consolide par pierres	Olivier, amandier	3+		
Reboisement et amelioration pastorale	Parcours, sol nu	3/1		

2. Identifier, décrire et évaluer les techniques

TECHNIQUE CES (MOTS CLES)	LAND USE TYPE	1: no succès 2: succès limité 3: Succes	Evidence	Facteurs de succès ou de manque de succès
AMENAGEMENT DES VOIES D'EAUX	(publique, etatique)			
Ouvrages de recharge en gabion	Lit oued principale	2/3		
protection de ravins	Lit oued, ravines	3		
Seuils en pierre seches	Ravines	3		
Lacs et barrages collinaires	Lit oued, per. irrigues	3/2		
Fixation bio-berges	Lit oued, ravines	3		
Curage recalibrage oueds	Lit oued	3		

3. Interventions possibles que les usager voudraient proposer

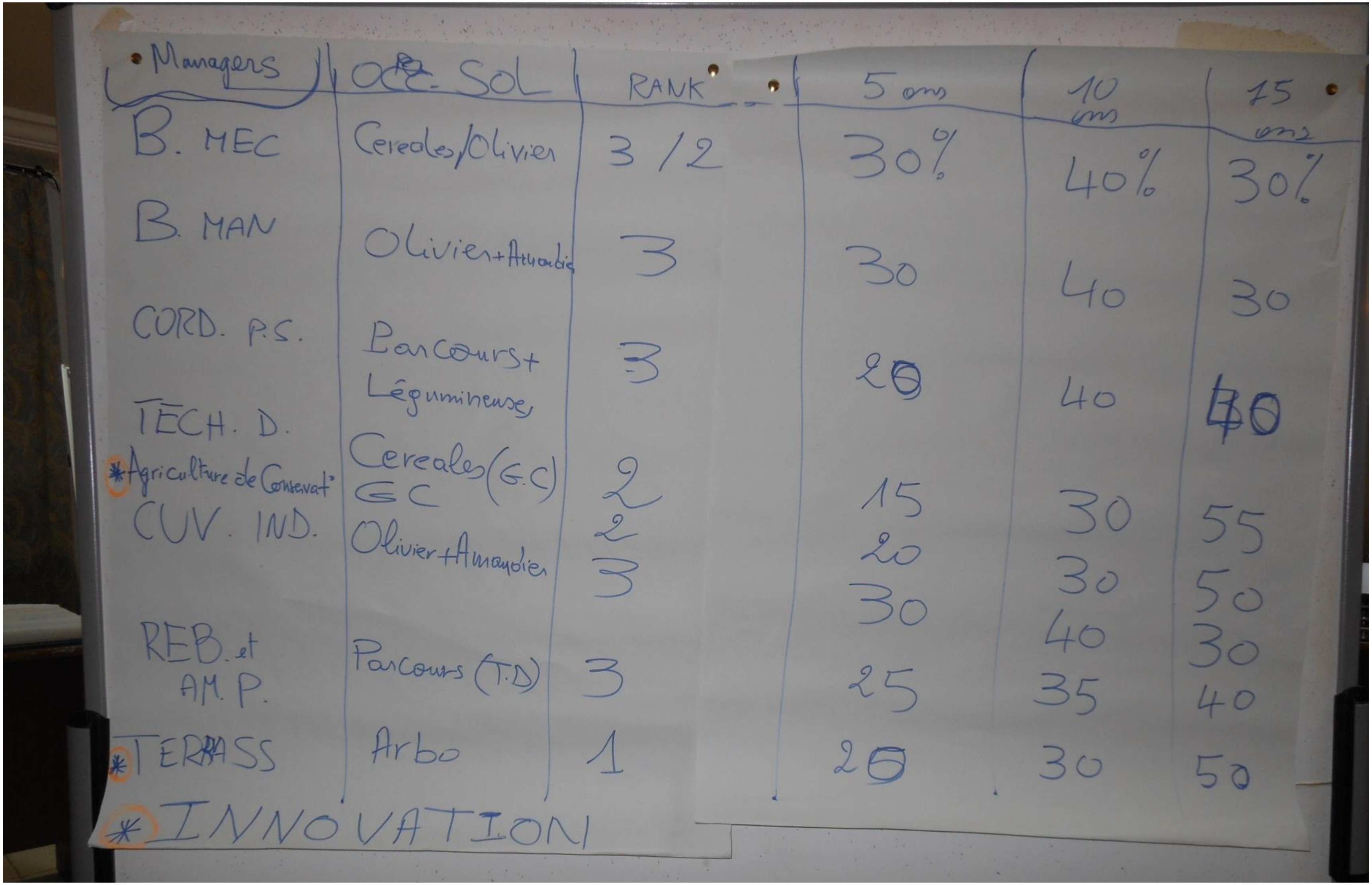




Groupes r
(chaque c
représent
chaque groupe)

4. Scenarios pour le futur

TECHNIQUE CES (MOTS CLES)	LAND USE TYPE	SCORE Importance (1/2/3)	%Area expected to be applied in the next 5 years	%Area expected to be applied in the next 10 years	%Area expected to be applied in the next 15 years
TERRES EN PENTE					
Banquette mecanique	Cereales, olivier, a pente forte		20%	50%	60%
Banquette manuelle	Olivier				
Cordon pierre seches	parcours degrades (sol nu, squelettique, en pente)				
Technique douce (labour en c.n., en bandes alternees)	Cereales, a pente faible				
Cuvette individuelle, bourrelet terre consolide par pierres	Olivier, amandier		60%	80%	100%
Reboisement et amelioration pastorale	Parcours, sol nu				


Managers
OCC. SOL
RANK
5 ans
10 ans
15 ans
B. MEC
Cereales/Olivier
3 / 2
30%
40%
30%
B. MAN
Olivier+Amandier
3
30
40
30
CORD. P.S.
Parcours+
Légumineuses
3
20
40
40
TECH. D.
*Agriculture de Conservat°
Cereales (G.C)
GC
2
15
30
55
CUV. IND.
Olivier+Amandier
2
20
30
50
3
30
40
30
REB. et
AM. P.
Parcours (T.D)
3
25
35
40
*TERRASS
Arbo
1
20
30
50
*INNOVATION

Demonstration and Functions' Explanation of the iLAMPT applied for Rmel watershed, Zaghouan,Tunisia

- Core model
- Data (**with iLAMPT demonstrations**)
- Parameters (**with iLAMPT demonstrations**)
- Uses for methodological sensitivity analysis (**with iLAMPT demonstrations**)
- Uses for generate soil and water management scenarios (**with iLAMPT demonstrations**)

Core model

- Terrain-based soil erosion assessment (LS or ST)

$$(m+1)\left[\frac{A_s}{22.13}\right]^m\left[\frac{\sin\beta}{0.0896}\right]^n$$

As= upslope area, Beta= slope,

- Revised USLE (LS*R*C*K*P)

- RUSLE adjusted by Sediment Delivering Ratio (SDR)

- **Net soil loss = RUSLE * SDR**

Sediment Dieivering Ratio (SDR)

The RUSLE model estimates an annual gross soil loss rate. To yield a net soil loss (NSL) rate at a pixel scale, the annual gross soil loss rate (E in Eq. (1)) has to be adjusted for Sediment Delivery Ratio (SDR) per cell (SDR_i) using a sediment delivery distributed model. According to Stefano et al. (2005), SDR_i indicates the probability that eroded particles mobilized from an individual cell are transported to the nearest stream pixel and can be calculated using the function of the form:

$$SDR_i = \exp\left(-\beta * \frac{L_i}{R_i S_i^{1/2}}\right) \tag{6}$$

where β is a routing coefficient, a catchment-specific parameter; L_i is the length of segment i in the flow path and is equal to the length of the side or diagonal of a cell depending on the flow direction in the cell; R_i is the coefficient based on surface roughness characteristics (see Table S4, Supplementary information); and S_i is the slope gradient (m/m).

Source: Le et al. (2012) Plennetary and Global Change J.
Note: some key publications will be enclosed in e-mail with all PDFs of presentations)

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