- **S1** EDEN toy model sheet (.rr file in online jupyter server cf S8)
https://docs.google.com/spreadsheets/d/1IrCeAi1dFjTwzKuUDb8ygEpvjty4-wmI-2ekZGucBe8/edit?usp=sharing

- **S2** Deer toy model sheet (.dr file in online jupyter server cf S8)
https://docs.google.com/spreadsheets/d/14iu6stBWVa7Xv17GU1mv5OBy22IMETv8EKKNuM3ALgQ/edit?usp=sharing

- **S3** EDEN translated Deer toy model .rr file (also in S8)
https://drive.google.com/file/d/1Lmt9y99ekUbVrFSHDGnxluVwBlhzUrMS/view?usp=sharing

- **S4** Dano EDEN models sheet
https://docs.google.com/spreadsheets/d/1KPbCWJ5UBG1zCEzYZgxWmDbecs7yVproF9XVAvOp_J0/edit?usp=sharing

- **S5** Dano Deer models sheet
https://docs.google.com/spreadsheets/d/1BhGrAzd3JVFHz2NS36yJMhmyX9dah7llDtTXBy2j5vU/edit?usp=sharing

- **S6** Python Labels code
https://drive.google.com/drive/folders/1O7XKeDv9st7pcBwPrmEQkdPFpD2mxJlM?usp=sharing

- **S7** Food security monitoring scheme table for biggest stabilities:

	Reference scenario	Climate change scenario
Parameters	Dr-, Rv-, Rr-, Ec+	Dr+, Rv+, Rr-, Ec+
Characteristic ecosystemic components		
SCC ones (except fixed scenario parameters)	Static: Dw+ and Aq+ and Ip- and Ps-	*Static: Dw+ and Aq+ and Ip-*
Clean food security	Static: Ng+ and Sd- and Li- and Fi- and degraded food security static ones	Same as reference scenario +Static: Ps-
Degraded food security	Sd+ or Li+ or Fi+ or Ng- Static: Bk+ and Ve- and Dn+ and Pi-	Same as reference scenario, changing: Sd+ or Li+ or Fi+ *or Ps+*
Food insecurity	Bk- or Dn- or Ve+ or Pi+	-Same as reference scenario
Disturbing food security		
Clean food security early warning processes	-attracting excessive livestock from abundant resources (rule ID 17) -degradation of soils from rainfed / irrigated crops cultivation, including growing demand / reduced fallows (rules ID 46 / 45)	-Same as reference scenario +Fire excesses from drought (ID 6) +Soil degradation from violent rains (ID 44) +*leading directly to food insecurity*: -Rainfed crops degradation from drought (ID31)
Degrading food security drivers	Crops and Indirect agency	Same as reference scenario, adding: Dr+, Rv+
Degraded food security	-Collapse of irrigated crops from soil degradation (ID 12) or from	ID 12, 38, 61, 62 (but not 15 and 39), cf reference scenario

early warning processes	excessive livestock (ID 15) -Collapse of rainfed crops from soil degradation, through reduced fallow / growing demand (ID 38) or excessive livestock (ID 39) -Conflict coming from livestock overgrazing (ID 61&62, only located in hill n°1 when in spatially explicit version) *Specific to spatial model*: -Trees collapse from livestock overgrazing in hills (ID 58) -Migration of fire towards hill n°2 (ID 110) +Cascading constraints both leading to conflicts Ve (ID 63)	*Specific to this scenario*: -Irrigated crops degradation from pests (ID 13) -Rainfed crops degradation from drought (ID 31), pests (ID 40), or drought, excessive fires, and trees absence (ID 42) *Specific to spatial model*: ID 39, 58, 110, cf reference scenario +Fire excesses from drought, in hills (ID 6) +Trees collapse from pests, in hills (ID 59) +Cascading constraints both leading to conflicts Ve (ID 63), (long cascades up to 4 constraints)
Collapsing food security drivers	Excessive livestock (Li), soil degradation (Sd), rainfed crops (Rc) and fire (Fi, local effect)	Same as reference scenario, adding: Dr+ and Ps+
Settling food security		
Degraded food security settling processes	-Restoration of distribution network from bank loans (ID 73) -Restoration of irrigated crops from ideal conditions (ID 77): Sd absent, or helped by bank loans (Bk) when Sd present (ID 76) -Price inflation stops when enough food production (ID 82, 83, 84) -Restoration of rainfed crops helped by bank loans (Bk) and ideal conditions (ID 89): Sd, Li, Fi all absents	ID 73, 82, 83, 84 (but not ID 76, 77, 89 specific to Dr-), cf reference scenario *Specific to this scenario (drought)*: -Irrigated crops restoration, from banks and dam water when no soil degradation nor pests (ID 79) -Rainfed crops restoration, from banks, Ngos / technical services and dam water when no soil degradation nor pests, excessive fire or livestock (ID 88)
Clean food security settling processes (from food insecurity)	Same as degraded food security settling ones without rule ID 76	Same as degraded food security settling ones
Food security settling drivers	Banks (Bk), rainfed / irrigated crops (Rc / Ic), indirect agency (ID 77)	Same as reference scenario without indirect agency, adding dam water (Dw) and Ngos / technical services (Ng)
Food security cleaning process (from degraded food security)	-Livestock excess releasing from fodder lacking (ID 69) -Restoration of fire situation from ngos/technical services (ID 75) -Restoration of ngos / technical services from banks (ID 81) -Restoration of soil situation from banks (Bk) & ngos / technical services (Ng) (ID 91)	ID 69, 75, 81, 91, cf reference scenario *Specific to this scenario (violent rainfall)*: -Restoration of pests situation from banks and Ngos / technical services (ID 85) *Specific to spatial model*: ID 60 (but not 90 as incompatible with violent rainfall), cf reference scenario ID 13, 31, 40, 42, cf degraded food security

	Specific to spatial model: -Local trees collapse from fire (ID 60), with cascading constraint collapse of fire as nothing else to burn on his spatial unit (ID 68). -Local fallow for soil restoration (ID 90)	early warning processes, local degradation collapse, cascading constraints as local habitat collapse for fire or pests (ID 68)
Food security cleaning drivers	Banks (Bk), Ngos & technical services (Ng), indirect agency (ID 69) and *local effects* : fire collapse & fallow	Same as reference scenario without indirect agency & local fallow (spatially explicit), adding one local effect : pests collapse

Reference and climate change scenarii, including non-spatial and spatial models. Knowing presence and absence of ecosystemic components allows to locate a given system state according to current food security, and according to potential food security dynamic. Thus the monitoring scheme helps to identify early warning signals and food security drivers.

In the reference scenario, main food insecurity early warning signals include livestock excess and soil degradation. And main food security drivers include crops, banks, Ngos & technical services. Climate change scenario adds pests and climate change to main food insecurity early warning signals, and dam water to main food security drivers.

- **S8** Online jupyter code to run & analyze models
https://snakes.ibisc.univ-evry.fr/jupyter/ecco/hub/login
login : deer.reviewer
password : shivering~squirreled[.chinks

- **S9** R code canonical graphs
https://drive.google.com/drive/folders/17E2PYk5ZPvIe1MFH3yxSREu0_uWPANGB?usp=sharing

- **S10** Biggest stabilities data used to write monitoring scheme table
https://docs.google.com/spreadsheets/d/1axKkLUH9FOzYYsMdWOJtuCsuEL7p_9QbMNQyCKZ3bD0/edit?usp=sharing

- **S11** Coloured version of Dano EDEN model variables and scenario initial states (Table 1)

Acronym	Description	Initial state Reference scenario	Initial state Climatic scenario
Atmosphere			
Dr	Drought	-	+
Rv	Violent rains	-	+
Rr	Rain randomisation	-	-
Soil			
Ip	Iron Pebble (petroplinthite)	-	-
Sd	Soil, degraded	+	+
Water			
Dw	Dam water (focused on Moutori dam)	+	+
Aq	Aquifer	+	+
Fauna			
Li	Livestock (in excess)	-	-
Ps	Crop pests	-	-

Flora			
Tr	Lignous plants (includes food & fodder trees)	+	+
Ic	Irrigated crops	+	+
Rc	Rainfed crops	+	+
Fi	Fire (in excess)	-	-
Human			
Ve	Violent events	-	-
Bk	Banks	+	+
Dn	Food distribution network	+	+
Pi	Food price inflation	-	-
Ng	NGOs & technical services (extension officers)	+	+
Ec	External commodities (food commerce)	+	+

- **S12** Processes emptying dam water in the climate change scenarii:

IDs 17 (excess livestock comes as abundant resources), 3 (drought empties dam), 4 (idem aided by livestock), 44, 46, 47, 48 (soil degradation from resp. violent rain, rainfed crops, livestock excess, fire excess), 96 (violent rain and soil degradation sediments dam) Acronyms dDw, dLi, dSd (indirect for most, cascading effect with constraint ID 98 excessive sedimentation emptying dam when Rv+,Sd+,Li+) ; + ID 45 dSd from Ic, not relevant in spatial model as Ic downslope.