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LOCAL INDICATORS

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Items: I: Institutional & Governancy; LCU: Land Cover & Land Use; SE: Socio-economics; VF: vegetation & Faune; WS: Water & Soil

N°	Types UNCCD	Item	Indicators and units	Methodology	Primary data availability	Feasibility	Cost	Reference	Comments
1	S1; S2	SE	Change of incomes and goods	Surveys: Perception of the households on their well-being (minus, plus, stable); change in the housing quality; change in migratory tendencies; perception of payment changes and of employment opportunities (minus, plus, stable)				Kerre & Chung, 2001 In: Anonyme (n.d.) Etude Sahel	
2	S1; S2	SE	Schooling rate (ratio between schooled people et total population)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms; exit in national data list
3	S1; S2	SE	Global activity rate (ratio between labour force and total population)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms

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4	S1; S2; S3	SE	Land ownership	Surveys				Medaction 2001,	
5	S1; S7	SE	Satisfaction rate of farm needs (agricultural, animal husbandry, general): ratio between realized production and expected production	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
6	S2	SE	Net income from agriculture (on going year only)					Kerre & Chung, 2001 In: Anonyme (n.d.) Etude Sahel	
7	S2	SE	Change of forest income	Surveys: Income change (less, more, stable); Water and soil conservation techniques assessment and erosion evaluation				Kerre & Chung, 2001 In: Anonyme (n.d.) Etude Sahel	
8	S2	SE	Effective activity rate (ratio between labour force and total population in age of working (18-64 years old)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
9	S2	SE	Income per inhabitant	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms; exit in national data list
10	S2	SE	Income per worker	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms

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11	S2	SE	Income proportion from the main activity in the farm economy	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
12	S2; S7	SE	Ratio between family labour force et external labour force	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
13	S2; S7	SE	Total agricultural area per inhabitant	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
14	S2; S7	SE	Autoconsumption rate of farming products (agricultural, animal husbandry, general): part of the products for autoconsumption	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
15	S2; S7	SE	Mechanization rate (agricultural, livestock farming, general): ratio between used equipment nb and workers nb)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
16	S4	LCU; VF	Sensitivity index/Plant association	Field work	Atlas formations pastorales CTA-CIRAD/Ap3a			Ickowicz et al. 2005,	
17	S4	VF	Wood density evolution/species/every 10 years	Field works_Measures on permanent plots	Cirad (projet LEAD) (PPZS, CSE)			Ickowicz et al. 2005,	

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18	S4	VF	Global botanical composition	Permanent site on the field				OSS, en cours de publication	Indicator of agroecosystem evolution
19	S4	VF	Species richness (global, perennial vs annual)	Permanent site on the field				OSS, en cours de publication	Indicator of agroecosystem evolution
20	S4	VF	Plant cover evolution	Permanent site on the field	Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution
21	S4	VF	Biological types	Permanent site on the field				OSS, en cours de publication	Indicator of agroecosystem evolution
22	S4	VF	Physiognomy change: plant association area (per facies and agrosystems)		Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution
23	S4	VF	Physiognomy change: ratio between ecosystems / agrosystems		Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution
24	S4	VF	Biotop diversity		Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution
25	S4	VF	Rain use efficiency for production		Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution
26	S4	WS	Slope length	Field work	Topographic maps from national mapping agencies			Medaction 2001; Enne & Zucca (n.d.).	
27	S4	WS	Slope steepness	Field work	Topographic maps from national mapping agencies			Medaction 2001; Enne & Zucca (n.d.).	

N°	Types UNCCD	Item	Indicators and units	Methodology	Primary data availability	Feasibility	Cost	Reference	Comments
28	S4	WS	Rock fragment (%)	Field work	Various soil maps: EUSIS; FAO/ISRIC			Enne & Zucca (n.d.).	
29	S4	WS	Soil depth (cm)	Field work	Various soil maps: EUSIS; FAO/ISRIC			Enne & Zucca (n.d.).	
30	S4	WS	Rain erosivity (mm/hour)	Field work	meteorological data from institutipns (regional, national and international)			CSFD WG, 2008	
31	S4	WS	Wind erosivity (m3/hour)	Field work: between 0-600 mm annual rain, volume of moving particle (severity classes)				WG CSFD, 2008	
32	S4	WS	Stability of the surface horizon	Field survey and laboratory analyses				WG CSFD, 2008	
33	S4	WS	Evolution of soil profile (humus, organic matter)	Field survey and laboratory analyses				NGOs and farmers organisations	
34	S4; S5	VF	Phytomass		Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution
35	S4; S7	SE	Carrying capacity evolution	Tropical Livestock Unit/ha; surveys				Carrière & Toutain (1995); ROSELT/OSS, 2005	
36	S4; S7	SE	Animal productivity evolution	Herd fertility; milk production; surveys				Réquier-Desjardins & Bied-Charreton, 2002	
37	S4; S7	SE	Animal density (UB/km2)	Counting / Surveys				Carrière & Toutain (1995); Réquier-Desjardins & Bied-Charreton, 2002; ROSELT/OSS, 2005	At national, regional and global: GLIPHA (FAO)
38	S4; S7	VF	Pastoral value		Land cover and land use maps			OSS, en cours de publication	Indicator of agroecosystem evolution

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39	S4; S7; T4	SE	Managed areas compared to initial goal (zaï, compost ...) in hectares	Field surveys; research and remote sensing				NGOs; Farmers organisations; Wani et al., 2005 In: Anonyme (n.d.) Etude Sahel ; Anon. 2008 GEF	
40	S4; S7; T5	LCU	Land cover (%) at local scale					WG CSFD, 2008	
41	S4; T4	VF	Potential evapotranspiration	Field work	GEODATABASE			http://geodata.grid.une.p.ch/	
42	S4; T4	VF	Evolution of the natural vegetation per hectare (number of seedlings) on protected and unprotected plots	Field work				NGOs; Farmers organisations	
43	S4; T4	VF	Drought resistance (capacity of the vegetation to resist to serious or moderate water stress)	Field work	Land cover maps with vegetation classes (physiological-structural classes) ; Remote sensing			Enne & Zucca (n.d.).	
44	S4; T4	WS	Water infiltration capacity	Field work and laboratory analyses				Wani et al., 2005 In: Anonyme (n.d.) Etude Sahel ; CSFD WG, 2008	See Cazenave et Valentin, 1992. Journal of hydrology
45	S4; T4	WS	Soil retention capacity	Field work and laboratory analyses				CSFD WG, 2008	See Cazenave et Valentin, 1992. Journal of hydrology

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46	S4; T4	WS	Organic C	Field work and laboratory analyses				Wani et al., 2005 In: Anonyme (n.d.) Etude Sahel; CSFD WG, 2008	See Cazenave et Valentin, 1992. Journal oh hydrology
47	S4; T4	WS	N, P and K	Field work and laboratory analyses				CSFD WG, 2008	See Cazenave et Valentin, 1992. Journal oh hydrology
48	S4; T4	WS	Cationic exchange capacity	Field work and laboratory analyses				Wani et al., 2005 In: Anonyme (n.d.) Etude Sahel	
49	S4; T4	WS	Soil biological indicators (soil microbiological biomass, breathing, enzymes, biomass N, microbiological species diversity)	Field work and laboratory analyses				Wani et al., 2005 In: Anonyme (n.d.) Etude Sahel	See TSBFs (tropical soil biology and fertility, CIAT)
50	S4; T4	WS	Fluctuation in water table level	Field work				Wani et al., 2005 In: Anonyme (n.d.) Etude Sahel	carefull with the interprétation , see Loireau, 1997

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51	S4; T4	WS	Surface water and water table quality	Field work				Scott Sxinton, 2006 In: Anonyme (n.d.) Etude Sahel	See Turbidity that shows soil erosion at watershed level
52	S4; T4	WS	Measures of water tables controlling aquifer characteristics; climatic variations ; drainage volume	Surveys: Change in number of wells; number of reloaded or dead wells; change of irrigated surfaces; change of season number for a field to be irrigated; change in drinking water availability				Kerre & Chung, 2001 In: Anonyme (n.d.) Etude Sahel	
53	S4; T4	WS	Longitudinal data on intra and inter annual variations of soil humidity by controlling climatic variability	Surveys: Change in farming systems (crop choice...); change in production intensity for rain-fed fields; yield change (less, more, stable)				Kerre & Chung, 2001 In: Anonyme (n.d.) Etude Sahel	
54	S4; T4	WS	Ravines (m/km2)	Remote sensing and field work				Kerre & Chung, 2001 In: Anonyme (n.d.) Etude Sahel	
55	S4; T4	WS	Superficial crusting rate	Field work				CSFD WG, 2008	
56	S4; T4	WS	Sand Silted surface Rate	Field work				WG CSFD, 2008	
57	S7	SE	Access radius for collecting firewood (duration)	Surveys				CSLP, 2003 and 2004 In: Anonyme (n.d.) Etude Sahel ; CSFD WG 2008	
58	S7	SE	Herd composition by animal species	Counting				Carrière & Toutain (1995)	

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59	S7	SE	Ratio between actual and possible carrying capacity	Field work				Carrière & Toutain (1995)	
60	S7	SE	Herd composition (sex and age classes)	Counting				Carrière & Toutain (1995)	
61	S7	SE	Domestic animal food practices	Field work				Carrière & Toutain (1995)	
62	S7	SE	Food complements (fodder...): Proportion of forage crops/exploited ranges; Type of supplement and supplementation practices	Remote sensing; field surveys				Carrière & Toutain (1995)	
63	S7	SE	Date of the transhumance start (current year, previous year, mean, min, max)	Transhumance surveys: herd composition, transhumance stages, departure date, departure reason, arrival reason, size at departure, size at arrival, size at return				Ickowicz et al. 2005,	
64	S7	SE	Location and density of firebreaks	Remote sensing; field surveys	Maps of firebreaks network			Ickowicz et al. 2005,	

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65	S7	SE	Density of decision centers (nb/km ²)	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha). Centres of decisions are situated in the ROSELT observatory, in which live individuals, (temporarily or not) who are decision makers (local actors of natural resource management and use). They are a priori rural centres. Some are urban areas more important than the others.

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66	S7	SE	Density of water point: nb/km2	Survey and census	Local authorities			ROSELT/OSS, 2005,	
67	S7	SE	Housing density	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).
68	S7	SE	Population growth rate	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).
69	S7	SE	Farming activities rate (sensu lato): ratio between population exploiting natural resources ('farming population' sensu lato) and total population	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).

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70	S7	SE	Agricultural working population: ratio between agricultural working population and total agricultural population	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).
71	S7	SE	Distribution of main and secondary activities (farming, pastoralism, forestry, marketing, handicraft...): diagram	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).
72	S7	SE	Distribution of farm size (total arable land or livestock size classes): diagram	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).
73	S7	SE	Equipment rate	Survey and census	Local authorities			ROSELT/OSS, 2005,	Indicator of human pressure on the observatory scale (50000-100000 ha).

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74	S7	SE	Total agricultural area (ie cultivated-annual or perennials- or fallow)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of health and stability of farms
75	S7	SE	Rate of multiple jobholding: Ratio between activities nb of the farm unit and woekers nb	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of adaptation ability of the farm unit to biophysical and human constraints
76	S7	SE	Rate of agriculture spread: ratio between newly developped fields nb and total field nb	Socio-economic survey				ROSELT/OSS, 2005,	Indexes of man induced pressure on plant ressources
77	S7	SE	Livestock increase rate: (newly acquired TLU or other unit)-(lost TLU or other unit)/(total nb of TLU or other unit)	Socio-economic survey				ROSELT/OSS, 2005,	Indexes of man induced pressure on plant ressources; TLU=Tropical Livestock unit
78	S7	SE	Livestock extensivity rate: Ratio between nb of animals grazing (TLU or other unit) and total nb of animals (TLU or other)	Socio-economic survey				ROSELT/OSS, 2005,	Indexes of man induced pressure on plant ressources

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79	S7	SE	Index of natural vegetation collection due to farming activities: (index of crops spread) * (index of recultivation during the observation period)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of agricultural pressure on resources
80	S7	SE	Index of natural vegetation collection due to pastoral activities (according to pastoral activities)	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of range pressure on resources
81	S7	SE	Fire wood collection (kg of dry matter / day / season): sum of all of the collected quantities, either used for cooking or heating (self-consumption), either sold	Socio-economic survey				ROSELT/OSS, 2005,	Indicator of forestry pressure on resources
82	S7; T4	SE	Fraction of farmers using alternative farming technics (other than traditional)	Local surveys				Réquier-Desjardins & Bied-Charreton, 2002; CSFD WG, 2008	
83	S7; T4	SE	Evolution of investment level	Labour employment, Pondage techniques (zaï, dikes), Use of fertilizer				Réquier-Desjardins & Bied-Charreton, 2002	
84	S7; T4	SE	Irrigated perimeter drainage	To be determined				Réquier-Desjardins & Bied-Charreton, 2003	

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85	T4	SE	Number of treated gully erosion_nombre de ravines d'érosion traitées (micro-barrages, seuils gabionnés, digues filtrantes, etc.)	Field surveys				NGOs; Farmers organisations	
86	T4	SE	Number of rehabilitated hectares into farmed, pastured and wooded land (ha)	Field surveys				NGOs; Farmers organisations	
87	T4	SE	Yields per hectare on treated plots compared to untreated plots	Field surveys				NGOs; Farmers organisations	
88	T4	SE	Number of planted seedling					NGOs; Farmers organisations	Family, community, scatered or grouped afforestation must be distinguished
89	T4	SE	Forest recover rate after 3 years					NGOs; Farmers organisations	
90	T4	SE	Afforested areas in hectares					NGOs; Farmers organisations	
91	T4	SE	Evolution of the mean family income (inc. The part due to actions to combat desertification)					NGOs; Farmers organisations	

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92	T4	SE	Evolution of migratory flow on a territory (rural exodus, population maintain, return) and link with the actions done to combat desertification	Socio-economic survey				NGOs; Farmers organisations; ROSELT/OSS, 2005	Indicator of adaptation capacity of farming system to biophysical and human constraints