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ANNEX 4: Preliminary impact chains and tables of indicators

As of 21/07/2019

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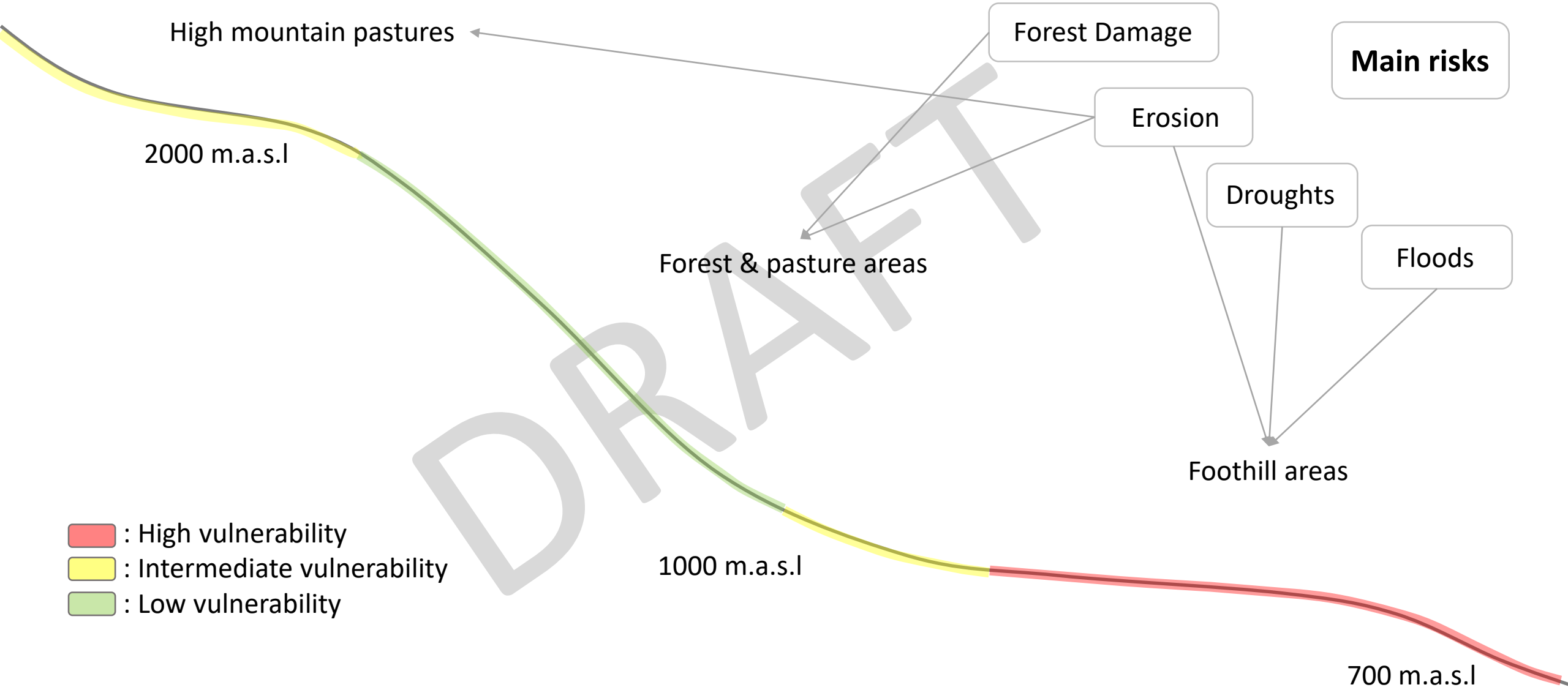
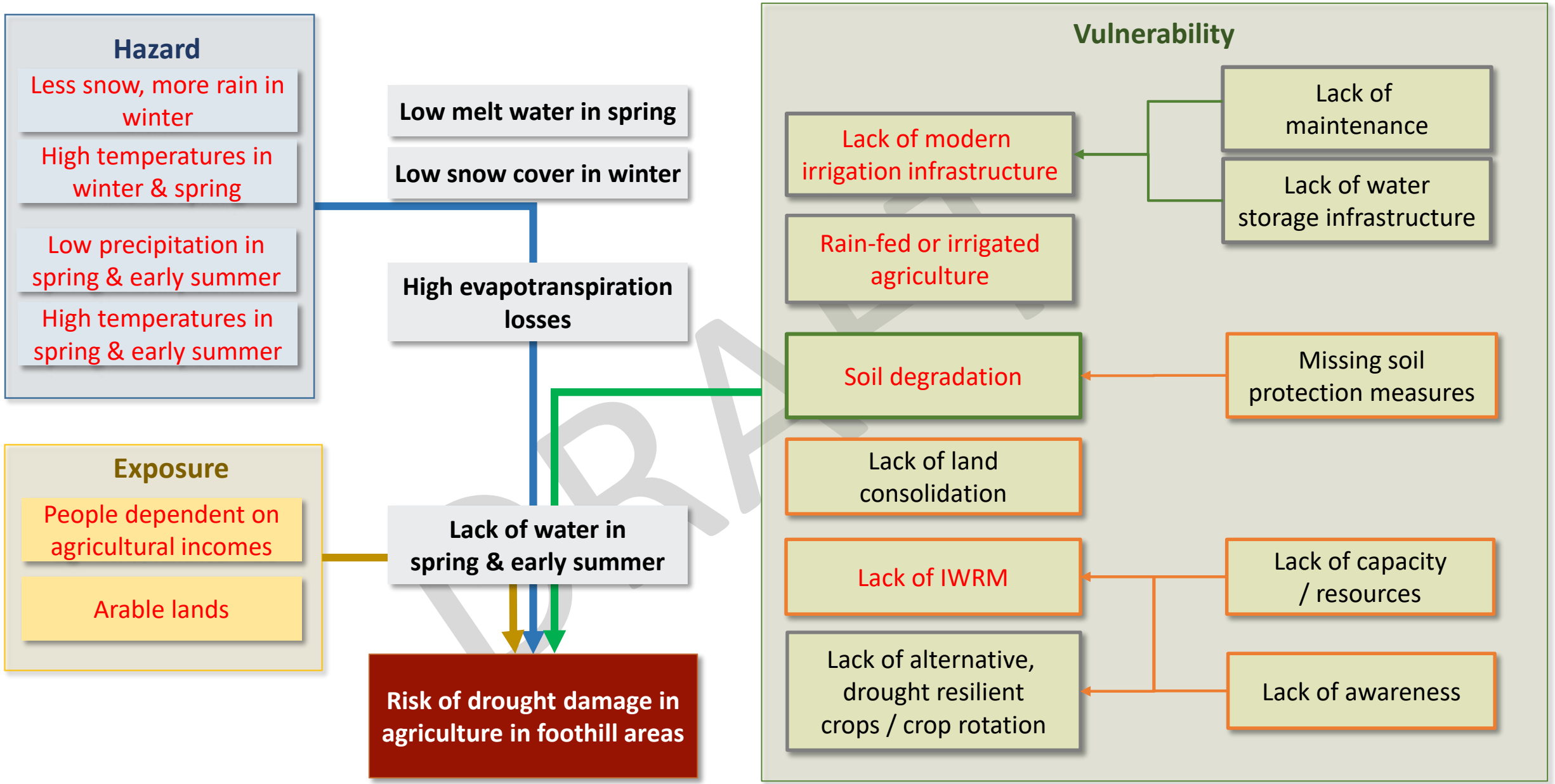
Overview of agroecological zones

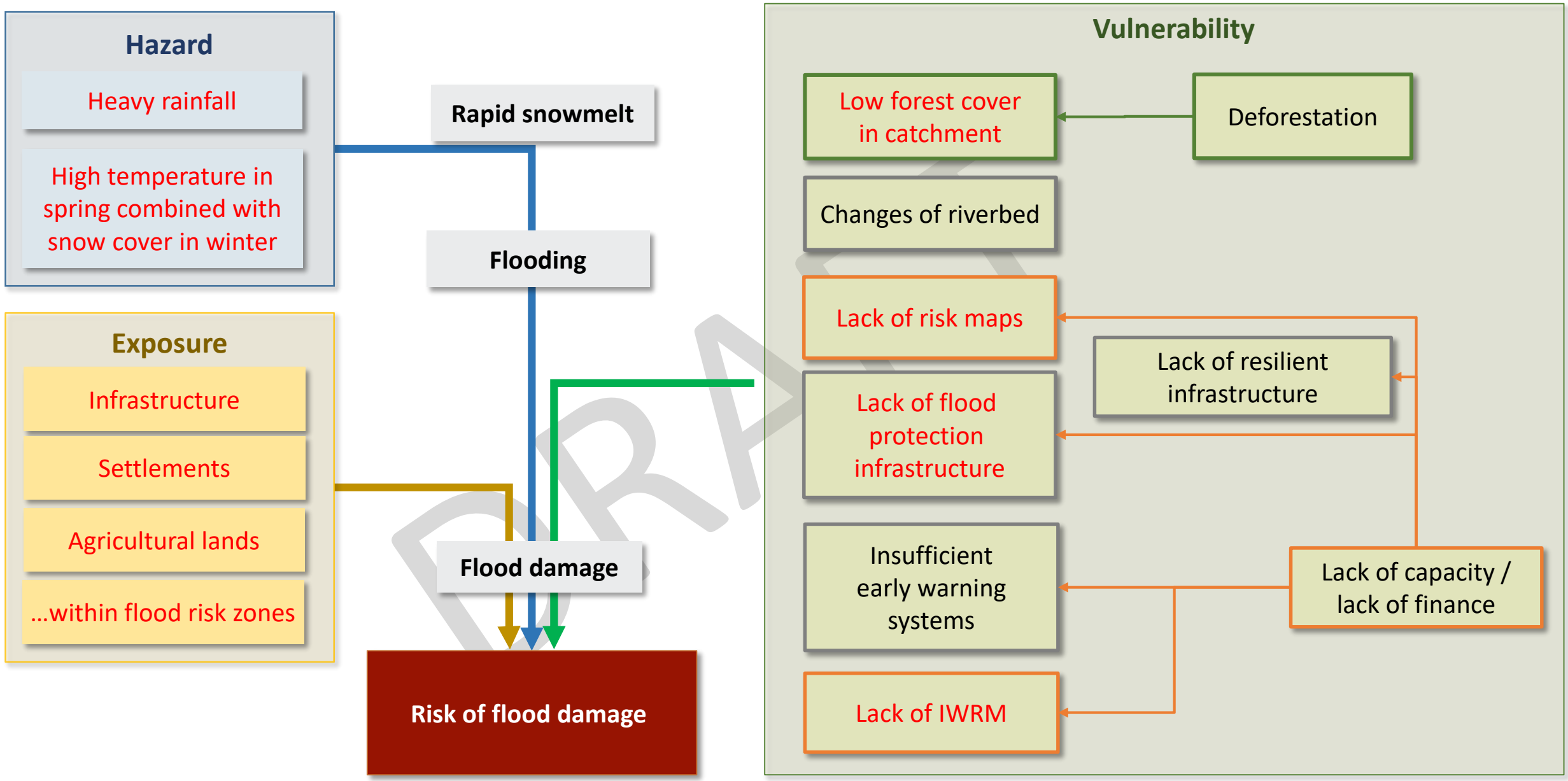
in the pilot districts Ismayilli and Shamakhi



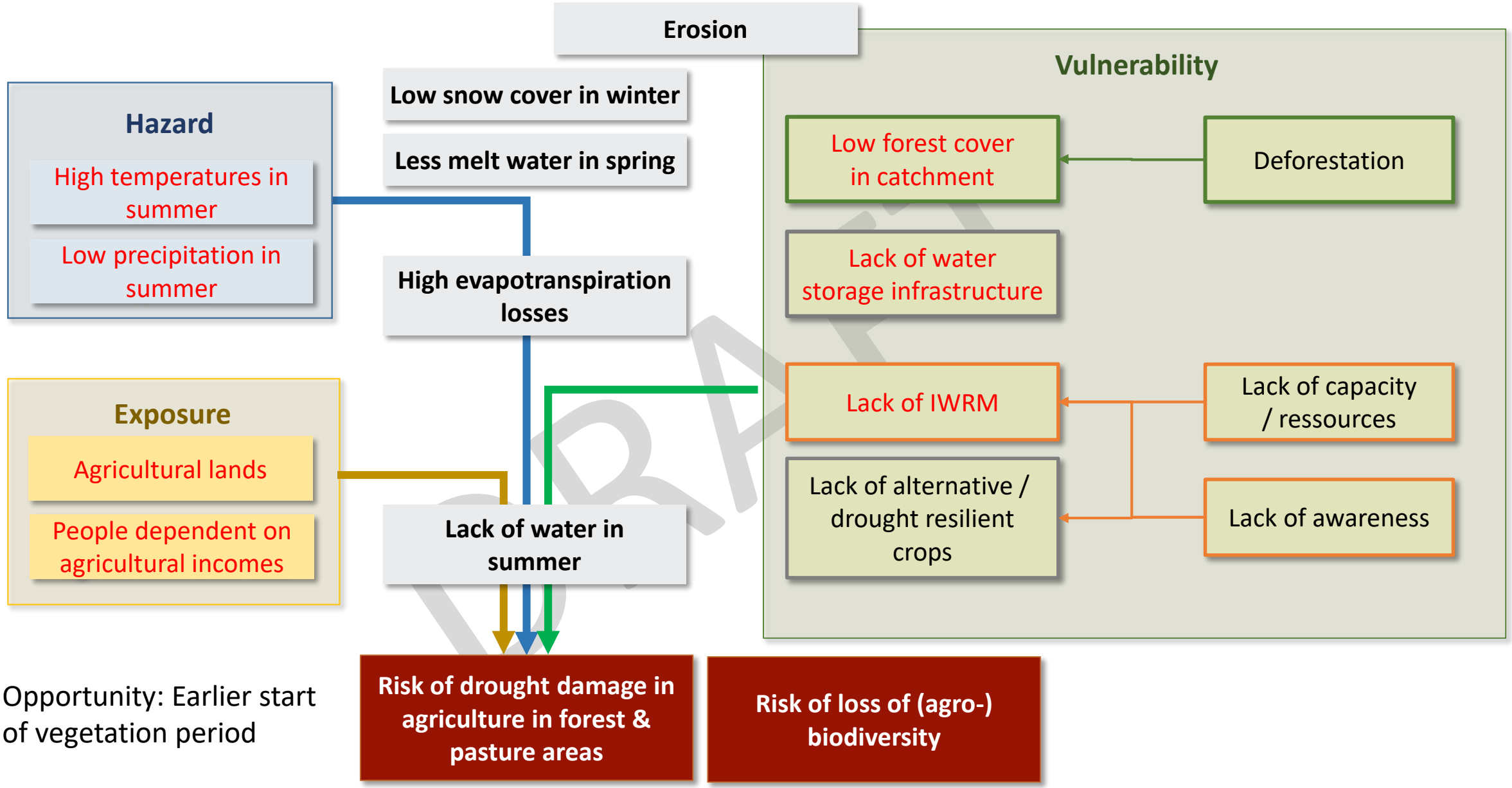
Drought in foothill areas



Floods in foothill areas

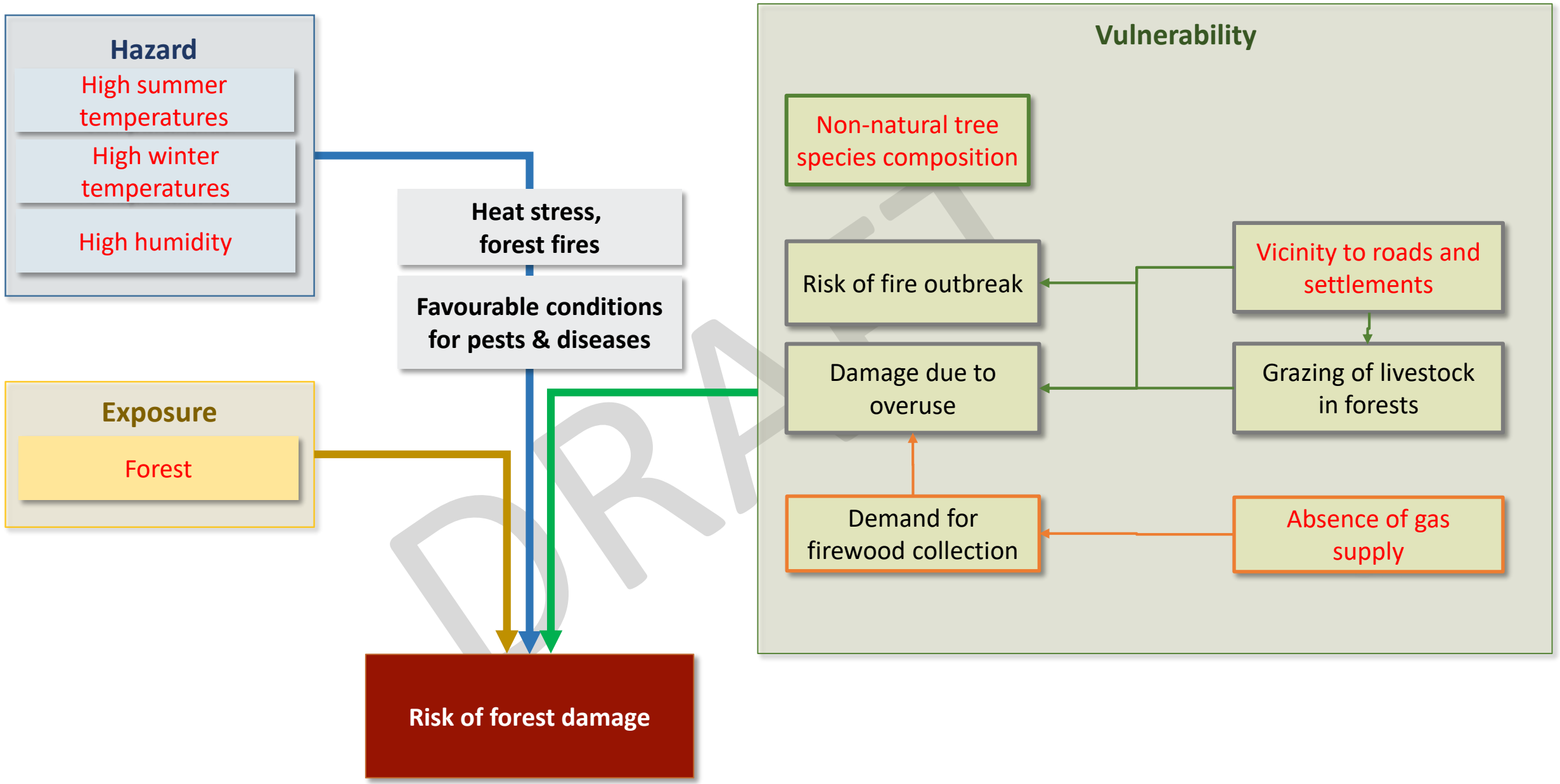


Drought in forest & pasture areas

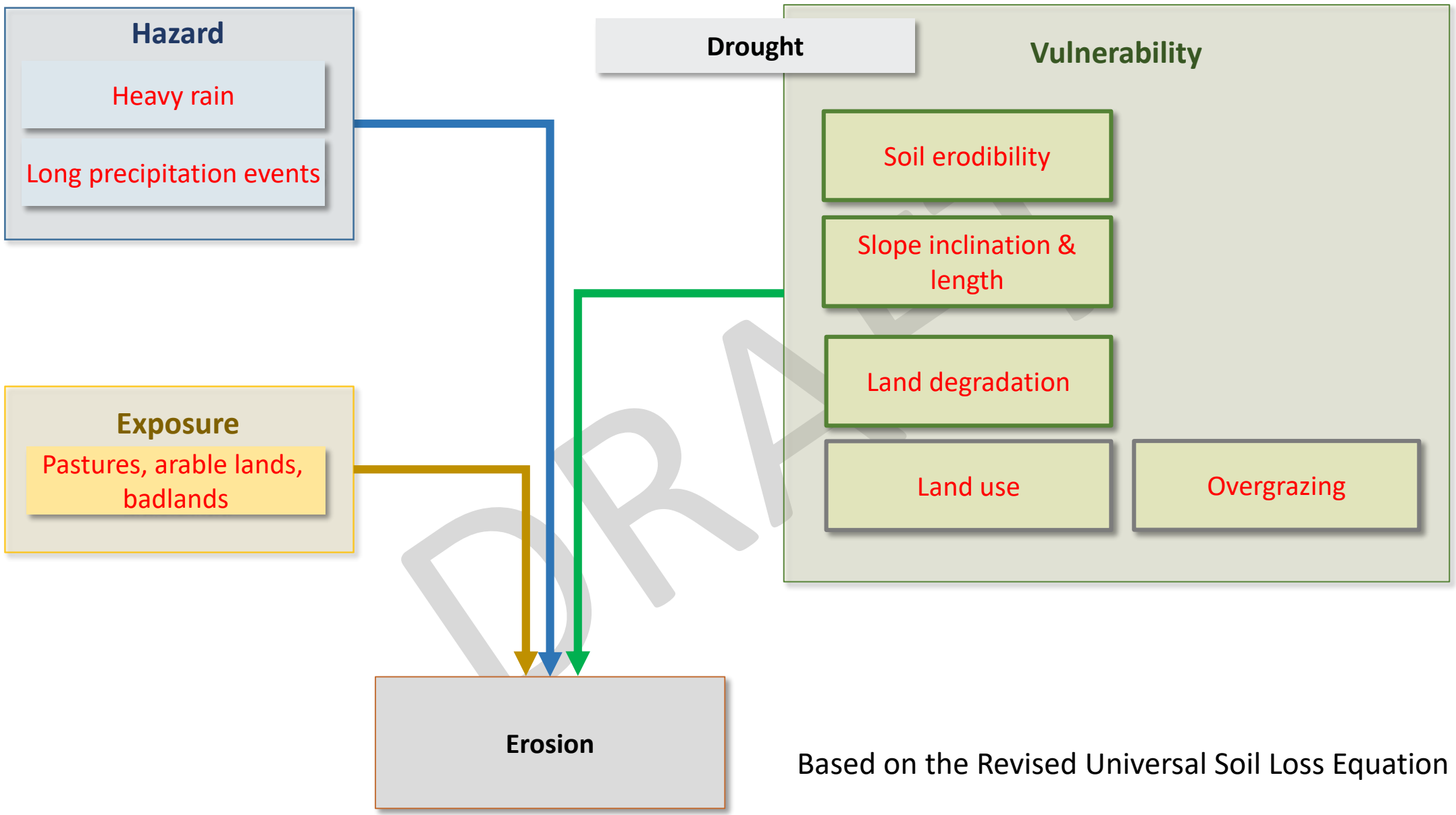


Opportunity: Earlier start of vegetation period

Forest damage



Erosion (all zones)



Based on the Revised Universal Soil Loss Equation (*RUSLE*)

Annex to preliminary impact chains

1.1 Impact chain drought in foothill areas – factors

Component	Factor	Potential indicator	Potential data sources	Adaptation measures linked to vulnerability
Hazard	Less snow, more rain in winter	Accumulated snowfall vs. rainfall (in mm)	Hydromet data	
	High temperatures in winter & spring	# of days with above-average temperatures	Hydromet data	
	Low precipitation in spring & early summer	# of continuous days without precipitation	Hydromet data	
	High temperatures in spring & early summer	# of days with temperatures higher than x °C	Hydromet data	
Hazard / Intermediate impact	Low snow cover in winter	% of surface covered with snow	Satellite data	
	Low melt water in spring	Amount of river flow	Hydromet data	
	High evapotranspiration losses	Evapotranspiration threshold trespassed for x # of days / season	Evapotranspiration formula / hydromet data	
	Lack of water in spring & early summer	Amount of river flow & precipitation	Hydromet data	
Vulnerability – Ecological Factors	Soil degradation	% of degraded soil?	Soil map	
Vulnerability – Socio Economic Factors	Rain-fed or irrigated agriculture	% of rain-fed / irrigated lands	Land-use map	
	Lack of alternative, drought resilient crops / crop rotation	Share of surface area of arable land per crop	Ministry of Agriculture (MoA)	
	Missing soil protection measures	Data on cultivation type (organic, conventional, …)	Ministry of Agriculture (MoA)	
Vulnerability – Technical factors	Lack of water storage infrastructure	m^3 of water storage available	Water department	
	Lack of modern irrigation infrastructure	% of lands covered?	Expert interviews	
	Lack of maintenance	Average of time since last maintenance	Expert interviews	
Vulnerability – Capacity factors	Lack of awareness	Share of people trained on IWRM / water saving irrigation techniques	Expert interviews	
	Lack of capacity / resources	Financial / human capacities of responsible entities	Expert interviews	
	Lack of IWRM	# of watersheds with IWRM	Expert interviews, reports	
	Lack of land consolidation	Average size of land plots	Ministry of Agriculture (MoA)	
Exposure	People dependent on agricultural incomes	% of total population	State Statistical Committee	
	Arable lands	% of total land surface	Land-use map, State Statistical Committee	

1.2 Impact chain floods in foothill areas – factors

Component	Factor	Potential indicator	Potential data sources	Adaptation measures linked to vulnerability
Hazard	Heavy rain	# of days with precipitation > 50mm	Hydromet data	
	High temperature in spring combined with snow cover in winter	# of days with above-average temperatures	Hydromet data	
Hazard / Intermediate impact	Rapid snowmelt	River flow higher than x m^3	Hydromet data, satellite data	
	Flooding	# of flooding events	Ministry of Emergency Situations (MES)	
	Flood damage	Amount of flood damage	Ministry of Emergency Situations (MES)	
Vulnerability – Ecological Factors	Deforestation	Change of forest cover over time	Satellite data	
	Low forest cover in catchment	% of forest cover in catchment	Satellite data, land-use map	
Vulnerability – Socio Economic Factors	Lack of resilient infrastructure		Local authorities (expert interviews)	
Vulnerability – Technical factors	Lack of flood protection infrastructure	% of settlements without flood protection infrastructure	Ministry of Emergency Situations (MES), local authorities (expert interviews)	
	Insufficient early warning systems	% of settlements with early warning system	Ministry of Emergency Situations (MES), local authorities (expert interviews)	
Vulnerability – Capacity factors	Lack of risk maps	% of settlements without adequate / up-to-date risk maps	Ministry of Emergency Situations (MES), local authorities (expert interviews)	
	Lack of capacity / finance	Financial capacity of responsible entities	Expert interviews	
	Lack of IWRM	# of watersheds with IWRM	Expert interviews, reports	
Exposure	Infrastructure within flood risk zones	Amount of infrastructure in flood risk zones (no elevation buffer around rivers)	Digital elevation model, satellite data	
	Settlements within flood risk zones	Amount of settlements in flood risk zones (no elevation buffer around rivers)	Digital elevation model, satellite data	
	Agricultural lands within flood risk zones	Amount of agricultural lands in flood risk zones (no elevation buffer around rivers)	Digital elevation model, satellite data	

1.3 Impact chain drought in forest & pasture areas – factors

Component	Factor	Potential indicator	Potential data sources	Adaptation measures linked to vulnerability
Hazard	High temperatures in summer	# of days with above-average temperatures	Hydromet data	
	Low precipitation in summer	# of continuous days without precipitation	Hydromet data	
Hazard / Intermediate impact	Low snow cover in winter	% of surface covered with snow	Satellite data	
	Low melt water in spring	Amount of river flow	Hydromet data	
	High evapotranspiration losses	Formula	Hydromet data	
	Lack of water in summer	Amount of river flow & precipitation	Hydromet data	
Influence of other impacts	Erosion	% of degraded land	Satellite data	
Vulnerability – Ecological Factors	Deforestation	Change of forest cover over time	Satellite data	
	Low forest cover in catchment	% of forest cover in catchment	Satellite data, land-use map	
Vulnerability – Technical factors	Lack of water storage infrastructure	m^3 of water storage available	Water department	
Vulnerability – Capacity factors	Lack of awareness	Share of people trained on IWRM / water saving irrigation techniques	Expert interviews	
	Lack of capacity / resources	Financial / human capacities of responsible entities	Expert interviews	
	Lack of IWRM	# of watersheds with IWRM	Expert interviews, reports	
	Lack of alternative / drought-resilient crops	Share of surface area of arable land per crop	Ministry of Agriculture (MoA)	
Exposure	People dependent on agricultural incomes	% of total population	State Statistical Committee	
	Agricultural lands	% of total land surface	Land-use map, State Statistical Committee	

1.5 Impact chain forest damage – factors

Component	Factor	Potential indicator	Potential data sources	Adaptation measures linked to vulnerability
Hazard	High summer temperatures	# of days with above-average temperatures	Hydromet data	
	High winter temperatures	# of days with above-average temperatures	Hydromet data	
	High humidity	# of days with above-average humidity	Hydromet data	
Hazard / Intermediate impact	Heat stress, forest fires	# of registered forest fires	Forest management department, MENR, MES	
	Favorable conditions for pests & diseases	# of days with temperature + humidity above average	Forest management department (expert interviews)	
Vulnerability – Ecological Factors	Non-natural tree species composition	% of forest with strongly anthropogenic tree species composition / mono-cultures	Land-use map	
Vulnerability – Socio Economic Factors	Vicinity to roads and settlements	% of forest area within x m of settlements and roads	Satellite data	
	Risk of fire outbreak	% of forest close to settlements / roads	Forest management department (expert interviews)	
	Grazing of livestock in forests	# of livestock in area	Ministry of Agriculture (MoA)	
	Demand for firewood collection	Availability / absence of natural gas	Forest management department (expert interviews)	
	Damage due to overuse	% of forest accessible / close to settlements	Forest management department (expert interviews)	
Vulnerability – technical factors	Absence of gas supply	# of villages / settlements without access to natural gas	Local authorities, Ministry of Energy	
Exposure	Forest	% of total land surface	Land-use map, State Statistical Committee	

1.6 Impact chain erosion (all zones) – factors

Component	Factor	Potential indicator	Potential data sources	Adaptation measures linked to vulnerability
Hazard	Heavy rain	# of days with precipitation > 50mm	Hydromet data	
	Long precipitation events	# of continuous days with rainfall	Hydromet data	
Hazard / Intermediate impact	Drought	See impact chain on drought risk	Hydromet data	
Vulnerability – Ecological Factors	Soil erodibility	% of degraded soil	Soil map, satellite data	
	Slope inclination & length	Slope inclination higher than x %, length > x m	Satellite data, digital elevation model	
	Land degradation	% of degraded land	Satellite data	
Vulnerability – Socio Economic Factors	Land use	% of rain-fed / irrigated lands	Land-use map	
	Overgrazing	# of heads of livestock / ha	Ministry of Agriculture (MoA)	
Exposure	Pastures, arable lands, badlands	% of surface area: pastures, arable lands, badlands	Land-use map, Ministry of Agriculture (MoA), MENR, State Statistical Committee	