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Is the pastoral production system compatible with the ecosystem sustainability ? —case of the tropical African Sahel

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Introduction The Sahelian Countries of Western Africa take many advantages of maintaining the pastoral system for economical , social and environmental reasons . Animal products , milk and meat , contribute to the food production and food security , they also provide an export capacity ; herds represent a considerable living capital ; animals offer a day to day support to populations living in the very extended pastoral and agropastoral areas ; being often the main source of income for them . If it is practiced with respect of the natural resources , the pastoral activity contributes to the maintenance of the natural ecosystems , reduces the fire hazard , and can coexist with wildlife . If not , it can degrade the environment . Can the African tropical pastoralists continue to sustainably use the nature ? In which conditions ?

Context The Sahelian belt located across the West side of the African continent in the south of Saharan desert is a hot semi-arid tropical region characterized by rainfalls strictly concentrated in summer , between 200 and 550 mm annually , and a long severe 8 or 9 months dry season . In such climatic conditions , temporal and permanent rivers , low lands , ponds and even lakes take a great importance for plants , animals and humans . In this context , the tropical vegetation is largely specific : the main landscape is a dry savannah commonly called Sahelian steppe , with a lower layer of dense or sparse annual grasses and phorbs , and an upper layer of sparse thorny bushes and small trees . Most of the vegetation can be eaten by herbivores .

Impacts on ecosystems Very early the humans developed pastoralism in this type vegetation , living with herds of domestic ruminants like cattle , sheep , camels and goats . In dry season , the green fodder is found only on trees and around superficial water , the main feed being the straw of grasses . Pastoralists cope with climatic variability and resource heterogeneity by various regimes of herd mobility . For centuries , human occupation remained light : grazing and browsing are supposed to have not significantly affected the natural regeneration of the vegetation . But in the recent times , human and livestock populations rapidly increased , creating locally , specially around the water points , an overuse of the natural resources , meanwhile the climate change reduced the rainfalls . Present climatic and/or human pressures jeopardize mechanisms of plant regeneration : locally land degradation extends and fauna disappears . Are now observed overgrazing and trampling by livestock , destruction of some tree regenerations , cutting of trees for wood , that are changing the vegetal cover in favour of the more resistant and drought adapted species . Runoff increases erosion and improves water accumulation in the lowlands . In such conditions , what is the future of Sahelian pastoralism ?

Conditions for a sustainable pastoralism

The consequences of the human pressure on the natural resources of dry lands are not a fatality . Understanding the mechanisms of changes and the human objectives , necessities and constraints allow the elaboration of sound and adapted policy and practice proposals aiming to reach healthy environments . Among the public interventions facilitating the pastoral resources use compatible with the functioning of the ecosystems and their own resilience , the following orientations are underlined :

- Rehabilitation and facilitation of livestock mobility and transhumance , even transboundary , as the main regulation factor of livestock pressure on vegetation , as well as risk management against climatic uncertainties .
- Programmes for creation or rehabilitation of water points like artificial ponds , wells and bore holes correctly disseminated in the pastoral regions , with management organization of water use , to open access to pastures .
- Elaboration of specific pastoral codes defining the status of the pastoral areas and resources and protecting them from land use changes threatening pastoral activities , like crop encroachment ; revising also the rights and obligations of pastoralists .
- Identification , equipping and organization of pastoral areas in agropastoral regions ; development of exchange relationships between farmers and pastoralists in these areas .
- Development of pastoral informations and information systems , including adapted early warning systems and chains of decision in case of climatic disasters .
- Support to professional pastoral organizations and associations ; training facilities and social development .