Editorial

Among the most useful trees growing without cultivation, must be reckoned: the gum-tree, the tamarind, the beautiful tabaldi (note: *Adansonia digitata*), and the egelit (note: *Balanities aegyptiaca*) before mentioned. The gum-tree *(Mimosa nilotica)* as it is termed in books, merits a different denomination in Kordofan, for the shape of the tree, its leaves and spines, differ materially from those of the *mimosa Nilotica*, properly so called. The latter tree yields common gum only, whereas that of Kordofan is of the finest description, so that it is erroneously distinguished by the name of gum-Arabic. In some parts of the country, the mimosa forms whole forests of vast extent; but the district of Bara furnishes the largest quantity of gum. The harvest is modified by the annual fall of rain, for, if it rain much, the trees sweat the more. The gum exudes from the bark of the stem and large branches, nearly in the same manner as the resinous exudation from the cherry-trees of Europe. In digging for a beetle, I casually observed that the gum proceeds from the root also. Sennaar, which is situated under the same degree of latitude as Kordofan, yields a far less quantity of this product. The gathering takes place a few months after the rain, in the months of December, January, and February. It is an exceedingly profitable affair to the government, and therefore a monopoly. But even in this undertaking, the Egyptians act with unparalleled neglect, and do not interfere when they see whole forests of gum-trees hewn down, and the ground converted into dockn (note: *dochen* in the German original, i.e. pearl millet *Pennisetum glaucum*) fields, although immense tracts of the country far better adapted for arable land remain uncultivated, by making use of which, the gum-trees would be spared. But the government does not trouble itself about such trifles, it merely scrapes together that which comes within its reach without paying the slightest attention to ulterior consequences. Of the plantation of young trees and the extirpation of such as are unprofitable, it has no idea, nature must attend to that business.

(Ignaz Pallme, Travels in Kordofan. Embracing a Description of that Province of Egypt, and of Some Bordering Countries, with a Review of the Present State of Commerce in those Countries, of the Habits and Customs of the Inhabitants, as also an Account on the Slave-Hunts Taking Place under the Government of Mehemed Ali, By Ignatius Pallme, from Notes Collected during a Residence of Nearly Two Years in Kordofan. J.Madden and Co. London, 1844, chapter XIII Products, pp 225-226)

The garrat (note: local name of *Acacia nilotica* in some parts of Western Sudan, comm. by Hassan Elnour and Abdelnasir Hanno) whose pod is employed in tanning, and the tamarisk *(Tamarindus Indica)* are likewise frequently seen in the province, but not in the same abundance as the gum-tree. The pods of the tamarind are collected and trodden into the form of cakes, which are dried, and either kept for domestic use or converted into commodity. A large quantity of this production is consumed in" the country. This tree suffers greatly by the locusts; for sometimes the inflorescence, sometimes the fruit, is totally devoured by these destructive insects, and in those years, there is, of course, a scarcity of this fruit in many villages.

(ibidem, chapter XIII Products, p 226-227)

Kordofan was since ever famous for its abundant resources in gum arabic. This richness was one of the reasons of the Turkish-Egypt invasion in 1820. Al-Ubayyid

fell on 20 August 1821. The Egyptians immediately set up a monopoly on the gum trade thus taking over control and centralising the accumulating benefit of the trade in the hands of a few, though some traders still were allowed to organise their trade deliberately. Anyhow, only after international pressure the Egyptians were forced to give up the monopolies in 1849. Immediately afterwards international merchants set up to buy gum and to transfer it to and sell it in Cairo or Alexandria with expectation of extremely high profit rates. The export of gum arabic increased from around 1800 till the mid-century from approximately 150 tons to 900 tons p.a. After the Mahdist state once more monopolised the gum trade in the 1880s and was abolished by the Anglo-Egyptian invasion the re-establishment of an extended trade in gum which led to an increase from under 2000 tons in 1899 to 19.500 tons in 1912 was stimulated. Gum provided then about 43% of the total export income. The following decades saw the greatest flourishing of the gum trade when export reached 27000 tons in the early 1930s and nearly 50.000 tons in the 1960s. After the severe drought periods in the early 1970s and early 1980s the gum trade broke down and less than 20000 tons p.a. was traded to Port Sudan (Stiansen 1998). Today the exports by Sudan's government-controlled Gum Arabic Company are extremely low due to impacts of political instability (2006: 9000 tons p.a.!) especially with regard to the Darfur conflict. Revenues are more and more driven by swings in production and dropped from USD 5000,- to an average of appr. USD 2000,-. Interesting to realise that nowadays revenue from Sudan's gum arabic totals less than $80 million a year, far less than the $4 billion to $6 billion the country receives from oil production.

Kordofan is struggling with climatic impacts, periods of drought and periods of strong winds, with human impact, misuse of the land, overgrazing and overbrowsing, with ethnic conflicts pushed by the southward movement of nomads and transhumants, and of the northward movement of sedentary farmers at the same time, as well as with socio-ethnic and socio-political conflicts destabilising the western parts of the gum arabic belt in the Darfur region. The spatio-temporal dynamics of regional and local patterns of various intensities of impacts, of heterogeneous causes and reasons, and the effects both destructive as devastating have to be coped.

A better understanding of the variations of interactions of man and nature, of land use and eco-climatic constraints, of ethnic conflicts and political arbitrariness is needed in order to set up stringent land management strategies all over the globe in general and in the Kordofan in particular. Knowledge about the heterogeneous driving forces affecting land use systems under semi-arid to arid conditions, systems squeezed by peoples forced into migration, systems still able to recover under certain circumstances as proven by specific regional research, is still low compared to the urgent needs for implementation of sustainable socio-ecological and socio-economical planning and development. Why is spatio-temporal monitoring of land use and land cover by means of space-borne earth observation if not anymore elitist and expensive as in former decades still a black box for the governmental stakeholders from national to regional level? Why are management practices and strategies of regional development still paperwork but not appropriate tools for decentralised and participative action in the affected regions?

The PhD thesis of Hassan Elnour Adam Zakaria focuses on research on the values of space-borne remote sensing for monitoring the gum arabic belt in the Kordofan in order to thoroughly assess and analyse quantitative and qualitative param-

eters of land cover and land use change. Research is urgently needed to develop and provide a sound methodology for periodical assessment of the spatio-temporal patterns of regional climatic and human impact on the respective land use system of *Acacia senegal* (and *Acacia seyal*) forest stands with special regard to significant trends of decrease of tree stands all over the belt due to human pressure. One fifth of the Sudanese population lives and two thirds of the livestock population are raised in the gum arabic belt. Conflicts of different and often contrary land use interests are obvious. Earth observation allows for a large-coverage accurate detection of trends in land use and land cover change in the belt and of specific variations in the distribution and density of *Acacia senegal* stands in particular. Nevertheless intensive research is needed to develop, amend and analyse various qualities of data, different approaches to image classification as well as of strategies to combine terrestrial (in-situ-verified) sampling data with remotely sensed data in order to allow for an estimation of forest stand parameters in relation to spectral information provided by imagery.

Sound research on innovative approaches of combination of satellite image analysis both pixel- as well as object-based, and of the application of regression models for estimation of *Hashab* forest stand parameters from spectral information of satellite imagery is provided. A clear perspective for the implementation of remote sensing forestry in efforts to set up long-term monitoring programmes for assessment of state and dynamics of change of *Acacia senegal* forest in the gum arabic belt in Kordofan is given. Several minor omissions concern inconsistencies in the methodological and textual representation of details of image analysis by segmentation and feature extraction, in the lay-out of the strategies of in-situ sampling and related statistical analysis as well as in the assessment of image elements allowing for the visual interpretation of specific patterns of land use and land cover as a precondition for selection of reliable land use and land cover categories for further classification. A more detailed representation and discussion of image features versus in-situ photographic documentation and description would have been valuable. The value of the research is evidently based on its thorough integrative structural approach to multi-sensor and multi-temporal image analysis as well as on its strong effort to imply strategies of in-situ sampling of quantitative inventory parameters towards their statistical evaluation via spectral analysis. The appropriate design of the data input as well as the data interpretation and classification based on spectral, object and field parameters builds a novel hybrid strategy of monitoring and assessment of *Acacia senegal* forests. It is strongly recommended to further operationalise the approach and to implement it in the activities of the Gum Research Centre at University of Kordofan, al-Ubayyid, being the home university of Hassan Elnour Adam Zakaria.

The research study of Hassan Elnour Adam Zakaria is a most valuable and important contribution to building and putting into operation sound strategies of regional planning and management in the Sub-Saharan fringe of the semi-arid lands of Kordofan with special regard to the sustainable development and management of natural resources of the world-wide unique gum arabic belt of the Kordofan, a cultural landscape which underlay transformations since thousands of years and still provides resources to people and herds on the one hand, and inherits a unique cultural and natural heritage on the other hand.

References

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