

CHAPTER 10B

COMMENTS ON “RELEVANCE OF KEY RESOURCE AREAS FOR LARGE-SCALE MOVEMENTS OF LIVESTOCK”

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This chapter deals with the issue of so-named ‘key resource areas’. These particular localities within a landscape are endowed with resources that allow many more animals to live there than would have been expected on the basis of the ‘general’ features of that landscape or ecosystem. Scholte and Brouwer (Chapter 10) advocate the point that the resource under scrutiny in the ‘key resource area’ is not by necessity herbage; it can also be water. In deserts, oases have in fact been considered as such for millennia and people found them even worth defending at quite great cost. This is confusing, though, because indeed water is a resource for the vegetation and indeed water is a conditional necessity for most animal species; however, it is not a key resource in the sense of Illius and O’Connor (1999), because once the conditionality of the presence of water is sufficiently met there will be no further increase in herbivores. Yet, Scholte and Brouwer rightfully concentrate on floodplains and wetlands. Wetlands and especially their associated grassy floodplains have for hundreds of years played a key role in the economies of Fulani (Peul) and other cattle-herding societies. The same holds for those in southern Africa along, for example, the Zambezi, where Barotse have herded their cattle for generations, or along the Nile, where Nuer and Dinka have done the same (see, for instance, the work of Evans-Pritchard 1940). In East Africa, key resource areas have also been identified by anthropologists already in the 1940s: in areas where floodplains did not fulfil this function, mountains were catching higher amounts of monsoonal rainfall (Huntingford 1933, 1953a,b; Homewood and Rodgers 1991; McCabe 1994; Prins and Loth 1988; Sperling and Galaty 1990; Ruttan and

Borgerhoff-Mulder 1999; Prins 1999). So, at first sight one might think that Illius and O'Connor's (1999, 2000) formalised approach to this phenomenon was unimportant. When they mulled over this age-old concept, they concentrated on herbage (and not water) in these key resource areas, and looked at the significance of a localised high resource concentration within a landscape with a much higher resource dilution. Moreover, even though water is of the essence for plants and plant-eaters, and every herdsman or grazier will have a vested interest in it, herbage is much more interesting a resource than water is from a theoretical (and management) perspective, because of the more complicated feedback relations between herbage and its consumers. Illius and O'Connor then basically asked two questions, namely, "What is the effect of such an uneven distribution for the population dynamics of herbivores making use of that resource?" and "What consequences does this have for utilization and the chances of over-utilization of the resources in these two different compartments of the ecosystems?". Especially this latter issue may be of great concern when floodplains are restored or cut off from a migratory system.

The strength of the chapter by Scholte and Brouwer is that they systematically discuss the strong and weak points of the concept. They do this at the hand of a particular floodplain, the one of the Logone River, within a semi-arid, larger ecosystem south of Lake Chad. Scholte has a deep and multifaceted knowledge of this particular area, and both he and Brouwer have a long familiarity with other West-African wetlands. In their systematic discussion of the different aspects they clearly draw on this understanding, and they try to sharpen up the concept of 'key resource areas'. They point out that the herbivore density in these key resource areas is much higher than expected on the basis of the general relation between rainfall and herbivore mass, as was also found for East-African areas with upwelling groundwater (Lake Manyara NP: Prins 1996; Lake Nakuru NP: Mwasi 2002). Their main insight comes from a paper by Scholte et al. (2006), in which they studied the distribution of cattle and of cattle herds with their owners across the floodplain (the key resource area) and the adjacent dry lands. Although the density was as expected, namely most herds in the key resource area, the individual herder is equally well off in the non-key resource areas. However, because of the lower available herbage biomass outside the floodplain, the cost of trying to make additional use of forage is higher for a marginal herder outside the key resource area than inside the key resource area; herders thus distribute themselves over the landscape according to an ideal free distribution. Supporting revealing information is presented by Scholte and Brouwer in their Table 10.3. This underscores their point that the average individual herbivore has the same production parameter values in a key resource area as in the surrounding dry lands. In other words, the conclusion of Scholte and Brouwer is that individual herbivores are distributed across the landscape according to an ideal free distribution, and the fitness of individuals is on average the same whether they live in a key resource area or not.

The weakness of the approach of Scholte and Brouwer is that they do not provide insight into the questions of population dynamics that are so central to Illius and O'Connor's papers: whether the Logone floodplain acts as a source and the

surrounding dry lands as sink, does not become clear. Scholte and Brouwer focus on the point that in West Africa, areas with floodplains have a higher average livestock density than areas without. This indeed is covered in our previous paragraph. If the fitness of individuals in the different areas is equal, and if the costs of settling in the surrounding dry lands is, on a *per capita* basis, higher than in the floodplain, then it may be speculated that these floodplains do not act as source at all!

Another small weakness of this chapter is that floodplains are implicitly supposed to be areas with a high production of palatable grasses (and, thus, key resource areas). Indeed, if one thinks of *Leersia* meadows, then this might be true. However, many wetlands are covered with plants that are not limited by the availability of water; they invest heavily in tallness so as to outcompete other non-woody species. The *Typha* swamps in East Africa, the *Papyrus* beds along the Nile and in the Sudd, or the *Phragmites* marshes of Mozambique and South Africa all may seem to be key resource areas, but from a herbivore point of view, these areas have little use but for elephants. Where Scholte and Brouwer are of the opinion that it does not matter that Illius and O'Connor focused on primary production, we maintain that it does, and that one should not look at primary production *per se* but at digestible dry-matter production. Here we find another argument to focus on food, not on water.

The major assumption by Illius and O'Connor, viz., that *inside* a key resource area herbivores (a) have a density-dependent relation with their food source; (b) compete for resources because they impact severely enough on the vegetation; and (c) are thus regulated, while *outside* that area, in the surrounding dry lands, herbivores (a) do not have a density-dependent relation with the vegetation; (b) do not compete for resources; and (c) are not regulated there, is not very well addressed by Scholte and Brouwer. Indeed, they suggest that, because there was no strong impact of grazers on the vegetation in West-African floodplains, there was no density dependence in these areas, while there was a strong effect on the vegetation outside these floodplains. The reported intra-specific competition for high-quality forage and adjustment of the length of the stay on resource availability in the key resource area, however, seem to contradict the supposed absence of density dependence.

The conclusions of Scholte and Brouwer appear to be diametrically opposite the assumptions of Illius and O'Connor, but they do not zoom in on this. Similarly, the findings of Scholte et al. (2006) and also Table 10.3 appear to suggest that competition is not stronger in the floodplains than in the surrounding dry lands, again not supporting the major assumptions of Illius and O'Connor. We think that Scholte and Brouwer then should have drawn one of *two* possible conclusions, namely (a) floodplains are local ecological optima with resources that are the key to survival for herbivores and pastoralists depending on them, but they do not support Illius and O'Connor's basic assumptions about what key resource areas are supposed to be, in other words, floodplains are not key resource areas; or (b) Illius and O'Connor's definition of 'key resources' and 'key resource areas' was not adequate. Scholte and Brouwer clearly draw this second conclusion without openly rejecting the first. However, by changing the definition as given by Illius and

O'Connor, they reject the idea that herbivore numbers are regulated in a density-dependent manner by the limited resource in the key resource area where equilibrium conditions exist, while in the largest part of the ecosystem the animal population is uncoupled from the resources, thus easily causing vegetation degradation outside the key resource area. In other words, the resources in the key resource area are not analogous to supplementary feeding, often leading to severe range degradation. This has the important effect that restoring floodplains is perhaps not dangerous for the ecosystem, because if these floodplains were behaving as Illius and O'Connor postulated, then their restoration could lead to severe overgrazing of the surrounding dry lands! The alternative interpretation of Scholte and Brouwer is much less spectacular: perhaps floodplains are just what they are supposed to be, namely a feature in the landscape allowing more animals and more people to live. In that case, restoration is a good idea.

What we clearly miss, though, is good individual-based models coupled to life histories of many marked individuals in these heterogeneous landscapes where we have detailed knowledge of pasture production and individual consumption. Only with these tools can we really choose between the two different interpretations of the landscape.