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Eroded consensus:

How ever-changing policy narratives distort the interpretation of livelihood systems

The uneasy relationship between science and development

A case study from Central Tanzania

Gerrit Holtland
Nuffic

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List of abbreviations

BRALUP	Bureau of Resource Assessment and Land Use Planning
DCT	Diocese of Central Tanganyika
DUSER	Dar es Salaam/Uppsala Universities Soil Erosion Research Project
HADO	Hifadhi Ardhi Dodoma or the Dodoma Soil Conservation Project
ICCO	Inter-Church organisation for development co-operation
IFPRI	International Food Policy Research Institute
IRA	Institute for Resource Assessment (previously called BRALUP)
KEA	Kondoa Eroded Area
KIRDEP	Kondoa Integrated Rural Development Programme.
MALISATA	Man Land Interrelations in Semi-Arid Tanzania
MRTC	Mvumi Rural Training Centre
LPRI	Livestock Production Research Institute (in Mpwapwa)
SAREC	Swedish Agency for Research Cooperation
Sida	Swedish Agency for International Development Cooperation
SNV	Netherlands Development Organisation
UNSO	United Nations Sudano-Sahelian Office

1 Introduction

1.1 The role of research

Development interventions should be knowledge-based and a lot of research is undertaken to generate knowledge that could be used in development planning. Yet, in practice it is not easy to establish a direct link between research and development. The principle reason is that research is focused on identifying, describing and analysing phenomena with 'universal validity', while development planning focuses on re-combining a number of 'universal principles' with a large number of local realities into workable policies or interventions. Rip (2001) aptly describes this process as a double translation process: at the site of knowledge production from local to general and, after transportation and adaptation of the knowledge, from general to specific.

This paper starts from the recognition that research is needed to unravel local realities, but that financing research from development funds can only be sustained if the research generates relevant knowledge and ideas. Starting from one particular area and one particular development intervention, the paper will analyse to which extent research initiatives contributed to a better understanding of the development options in the area and to improving development interventions. The impact of research on the local reality is assessed. This can consist of new ideas, information, policies, technologies or practices that are relevant for farmers, extension workers, development practitioners, public- and private decision-makers and (local) politicians. The limitation of the approach is that we will not be able to fully assess the scientific, long-term impact of the research. On the other hand, this approach provides a bottom-up perspective. It shows how practitioners perceive the scientific debates that are raging on around them.

1.2 The case

The area concerned is Dodoma region in Central Tanzania. The intervention is the Dodoma Soil Conservation Project, better known by its Kiswahili acronym: HADO[1]. Although it worked only in Dodoma region, it provoked (inter)national interest via its bold actions. In 1979 it evicted all cows, sheep, goats and donkeys from Kondoa Eroded Area (KEA). In 1986 this was repeated in Mvumi division. In total more than hundred thousand animals were evicted from an area of two thousand square kilometres with over one hundred thousand inhabitants. The justification was that overgrazing, caused by overstocking had led to rampant soil erosion and land degradation.

However, livestock was the pinnacle in the local economy and culture and the measure was widely contested. The eviction of all ruminants (coined 'destocking') was a traumatic experience for the communities involved, while at the same time nobody knew how it would work out. From the onset it was clear that its success would depend to a large extent on the possibilities to bring livestock back into the area, in a system that would be both ecologically and economically sustainable. But how this could be done was unknown. It was a large scale, real life experiment. With two different areas being involved, the set-up even seemed to be that of a well designed experiment that offered an unique possibility to get a better understanding of livelihood systems in semi-arid Africa. One would expect development practitioners and researchers to be extremely interested in the outcomes, the more so as overpopulation and overstocking are major problems in semi-arid areas in Tanzania and Africa at large. Indeed they were; HADO received a wide media-coverage and two research programmes were attached to it, with a higher total budget than the project itself.

When we take stock, twenty years onwards, we see that the destocking was reversed in KEA. The traditional, extensive system of livestock keeping is back and land degradation can be expected be on

[1] HADO = Hifadhi Ardhi DOdoma

the agenda again in the coming decades. Yet, in Mvumi zero-grazing[2] has been adopted as an alternative way of livestock production. More then thousand cows are kept on zero-grazing by more then five hundred smallholders. Most experts, including myself, did not expect that it would be possible to practice zero-grazing in an area with 500 mm of rainfall. And yet this is what happened.

An even bigger surprise is that this transformation is ignored by the scientific community. There are dozens of publications which, based on the KEA experience, conclude that destocking failed and is not fit for replication elsewhere. Yet, there is not a single publication on the transformation that took place in Mvumi. Here we will analyse how this happened and what can be learned from this.

1.3 The approach

The approach followed can best be described as a combination of 'participatory observation' and 'a longitudinal study'. I try to make sense of my own experience with the role of knowledge by plotting it against the historical trends in the area and against the main trends in the discourse on development.

To be transparent to the reader, I will explain why I think to have sufficient insight to describe the role of knowledge and research in the area, accurately. Between 1990 and 1994 I worked in a rural development NGO: the Mvumi Rural Training Centre (MRTC). In this period I did research and collected as much literature on the area as I could get hold of. After leaving, I actively monitored the progress in Mvumi. I revisited the area in 1997 and 2002 and kept in touch with some people there. For this paper I contacted some key-actors as well[3].

Since MRTC had only four professional staff, all activities were implemented by government field workers; including those of HADO. Via HADO I became familiar with the work of two research programmes that I will describe in greater detail later. Being employed by SNV[4], I had intensive contact with SNV projects working on issues like land use planning and agro-forestry in Dodoma. On behalf of SNV, I participated in the formulation of the Kondoa Integrated Rural Development Programme (KIRDEP). MRTC was also collaborating with the local research stations in Mpwapwa (livestock), Kongwa (pasture) and Ilonga (crops). Indeed I was very well connected and I collected a huge amount of information. In 1994 I wrote an extensive farming system analysis of the area[5].

Participatory observation does have its limitations. Being so closely involved, I have to suppress any bias that could lead to misjudgements from my side. As Robert Chambers asked: who is to debug the debugger? I try to make my conclusions transparent by citing the publications I screened. This can have the effect of 'naming and shaming'. However, I can reassure the readers that I have no doubts of the good intentions of all of us. Yet, as we will see, good intentions are not enough. We simply have to do better. And indeed I use the word 'we' here; the story will show that I myself was a very inefficient player in the knowledge system. I went at great length to understand the farming system and to describe it. Yet, apparently, I failed to pass this on to others; leave alone that I managed to mobilise others to act on it.

[2] Zero-grazing simple means that cows are not grazing; the farmer has to bring all fodder to the animals (stall feeding)

[3] I am grateful to Mr. Ulomi and mr. Mwanalikungu, resp. the head of extension service and HADO in Mvumi. They went beyond the normal call for duty to make zero-grazing a success. I also want to thank those who assisted me with data and ideas to sharpen the analysis; Julius Bwire (Mpwapwa Livestock Research Institute), Brain Ogle (University of Uppsala) and Frits van de Wal, Felix Klein and Elise Pinners, former KIRDEP-staff. Special thanks for Willie Östberg, anthropologist of the MALISATA team, who wrote extensively on the relation between research and development interventions. His work inspires me, although I will never reach his level of perfection in analysing and describing the interaction between local communities and (intruding) outsiders. Lastly I wish to thank my colleagues from Nuffic. Jos Walenkamp, my director, who stimulated me to write this paper and Ad Boeren for his comments on an earlier draft. Any mistake of course remains mine.

[4] SNV= Netherlands Development Organisation; an independent development agency funded by the Dutch government

[5] Holtland, 1994. Whenever in this paper data are given without a reference, these can be found in this publication.

2 The context: the interpretation of livelihood systems

2.1 The livelihood system

Dodoma is part of the central semi-arid plains of Tanzania[6]. Annual rainfall ranges from 450 mm in the south to 900 mm in the north. Population density is among the highest in Tanzania and much higher then in neighbouring low potential areas. The region covers four districts; Dodoma Urban, Kondoa, Mpwapwa and Dodoma rural. The latter is the most dry (450-600 mm) and the poorest area.

Ninety percent of the inhabitants depend on subsistence farming. The majority are Wagogo and this paper focuses on their farming system. There are many other ethnic groups; e.g. in Kondoa district the Rangi are the dominant group. They are slightly better off in terms of rainfall, soil fertility and income.

The Wagogo are agro-pastoralists who combine the production of drought resistant food crops with extensive livestock keeping. The main crops are the drought resistant crops like pearl millet, sorghum and groundnuts. Maize is grown as well. Some 20% of the produce is marketed. The region harbours a herd of over one million heads of livestock. Although one must be very cautious when using the principle of 'carrying capacity'; the number of animals is roughly twice the amount that can be sustained by the natural resources.

Due to low soil fertility, low and erratic rainfall and a lack of any form of mechanisation or fertiliser application, crop yields are very low, in the range of 500 kg/ha. With 0.4 ha of arable land per capita, annually 200 kg of food is available per person, more or less the amount of grains a person needs to stay alive. Traditional livestock productivity is dismal as well, with some 50 litre of milk and 13 kg of meat per animal per year. As some production has to be sold to cover basics needs, it is clear that even in average years many people go hungry. Malnutrition is widespread, from a few percent in less populated areas, till over 50% in highly populated ones. Food aid is a permanent feature of the system; not in every village every year, but every year in a substantial number of villages.

In the beginning of the 1990's the average annual income per capita was estimated at 100 USD in rural areas and 150 USD near towns. In 2001 the regional average was estimated to be 175 USD[7]. So the Wagogo are extremely poor by any standard. Producing beer, salt or charcoal are important sources of income. In the most populous areas, up to 40% of the able men are involved in seasonal migration. In years with poor rains the situation worsens quickly.

2.2 Land use in a historical perspective

The long terms development theme of the area is the conflict between crop- and livestock production. Livestock is essential in the Wagogo culture and economy. It serves as a way to accumulate capital, to mobilise labour and to pay for dowries. It is the lubricant of the economy and serves as a control mechanism for elder generations over the (labour of the) younger generations. The rich use it to mobilise the labour of the poor. Livestock can knit families together via a trustee system ('songeleta') which means that the non-livestock owner takes care of the animals and gets part of their production (milk and off-spring). Although the area is very suitable for livestock, crops are more productive. In terms of Kcal and protein per hectare, as well as in terms of Kcal and protein per hour of work, crop production is at least three times more productive then livestock. This means that despite the crucial roles of livestock, economically the Wagogo depend on crop production.

Historically this dependency only came to the fore in the twentieth century. As long as the population density was very low, livestock and crop production could co-exist. As population density increased, however, the area under crops increased, as did the total number of animals. At a certain stage this

[6] Unless noted otherwise all information in this chapter is from Holtland, 1994
[7] Food Survey,2002

resulted in overgrazing and erosion. This caused a loss of vegetation and arable land, lower yields per ha and less water retention in the area. The increasing need for construction and firewood enhanced the land degradation process. Some external events accelerated it as well: the growing need for cash and the opening up of markets lead to larger surfaces under crops. Growing towns and (the construction of) a railway demanded even more construction wood and charcoal.

Sooner or later the system was no longer sustainable. Estimates on the maximum population density that can be sustained, with existing levels of technology, range from 32 to 40 inh./km^2. In 1988 the average density in Dodoma region was 30, but in some areas it was well above 100. Since crops are more productive, when population density increases, livestock will gradually be pushed out of the system. Data confirm this. While the cropped area per capita has remained constant in the twentieth century, at about 1 acre, the number of livestock decreased from two Livestock Units per capita in the beginning to one at the end. The number of families that have animals decreased as well. Although many think that nearly every family owns a herd, in practice only a decreasing minority does so.

Despite the shift towards crop production, the pressure on the natural recourses remains enormous and in many parts of Dodoma, the Wagogo ended up in the much-debated 'tragedy of the commons'. While all individually try to optimise their own income from a common resource, the final outcome is that the total benefit from the recourse is (far) less then optimal. To prevent such a tragedy a system is needed to regulate the access to the resource. The Wagogo used to have such a system. After the harvest the animals would first graze on crop residues; next they were moved to communally enclosed areas in valleys bottoms ('luwindo') and lastly they moved in privately enclosed areas ('milaga'; often an extension of a field or an area near his house). The access to the 'luwindo' was controlled by a supervisor who decided on the date of entrance and guarded the area against trespassers.

Unfortunately this system has collapsed, as have most traditional governance systems of the Wagogo. The demise of their decentralised decision making structure started already under the colonial rule of the Germans and was enhanced by the creation of strong (paramount-) chiefs under the British when they introduced indirect rule in 1926. At independence this system of chiefs was abolished and most power was concentrated in development committees, dominated by the national party and administrated by educated youngsters from outside the area. This move was the final blow to the 'luwindo' system. Traditional leaders could no longer enforce their decisions on livestock owners. The forced villagisation process that followed in the early 1970's meant the end of the 'milaga' system. People were living too far from their fields to effectively protect the areas they had enclosed and in the village people were living too close together to claim any land for animals (all was under crops).

So over time the Wagogo lost their ability to regulate the access to grazing areas and the livestock population. The state took over this responsibility. Already in the 1930's the colonial government enforced anti-erosion measures. Until independence they continued with a wide range of measures: making contour-bunds, cut-off drains, planting trees, terracing and forcing farmers to use manure in their fields. After WO II some local destocking was enforced as well. Sometimes, on a small scale, even both people and livestock were evicted. After independence soil conservation disappeared from the political agenda as it was widely perceived as a nasty colonial habit. Erosion however kept on increasing and was further enhanced by the (enforced) villagisation process of the 1970's. In the 1970's the situation was dramatic in several places and action had to be taken.

2.3 The destocking

In this context HADO was initiated in 1973. It stands in the long tradition of top-down state interventions aimed at soil conservation. Although it operated only in Dodoma, it was created under the aegis of the national department of forestry, as decision makers were afraid that local politicians would not be able to withstand popular pressure against the type of measures that HADO would have to take. The Swedish government (via Sida) sponsored HADO.

Initially HADO started with physical measures: especially tree planting but also making terraces, contour bunds and cut-off drains. Yet, soon it became clear that this would not be effective enough to halt soil degradation in the most affected areas. In 1979 it was decided to remove all ruminants from an area of 1.250 km^2 around Kondoa, a town in the northern part of the region; the so-called Kondoa Eroded Area (KEA). Some 73.500 people lived in the area (so 58 inh/km^2, with over 100 inh./km^2 in some areas[8]) and they owned 85.000 animals. Next to a ban on ruminants, people were also not allowed to cut trees, to open new fields on slopes or to burn any vegetation.

In 1986, the Mvumi division followed. This area, 40 km south-east of Dodoma town, is relatively fertile and flat and has fairly easy access to water. It has been overpopulated for over a century; when Stanley passed it in 1862 on his way to rescue Livingston, he complained about the dust. In the 1990's about 50.000 people lived in thirteen villages with a total surface of 730 km^2. The population density was 76 inh./km2; in the western part even 110 inh./km^2. At the same time some 1.500 families kept 50.000 ruminants, which equals the carrying capacity, if there would be no cropland. Overgrazing and erosion were rampant. With hardly any vegetation left, grass was scarce and firewood difficult to obtain. Rivers dried up very early in the dry season. Due to erosion and trampling by the animals, more and more fields had turned into hardpans and gullies were covering ever larger areas.

Both in Kondoa and in Mvumi there was resistance to the destocking. In KEA someone was killed in the process. On the other hand many people understood the rationale of the intervention. Yet again, it does not take much imagination to understand that the relation between HADO and livestock owners was tense at best and hostile at worst. Over time however more and more people saw the benefits: more firewood, more water in the rivers, more crop land, improvements of soils and yields, less eye diseases due to dust etc. The main problem remained however, where to get milk, meat and manure?

2.4 The introduction of zero-grazing

In the second ten-year plan of HADO (1987-1996) the introduction of livestock in the area was taken up as an objective. In 1987 a Swedish mission was fielded to assess the possibilities to integrate of livestock in the soil conservation program[9]. They focused on the introduction of dairy cows; either under a zero-grazing regime or in a fencing system. A combination of both was seen as most suitable: stall feeding in the wet season and grazing in fenced off areas in the dry season. The mission was afraid that in a total zero-grazing system, women would have to do most of the work without getting sufficient rewards for this. They estimated that improved cows under zero-grazing would produce 1.500 litre of milk per lactation of 1.5 years and that this would costs some 1.000 hours annually for collecting fodder and 1.100 hours for collecting water. These data proved conservative (as they should be), but fairly accurate[10]. HADO accepted the idea that animals could be brought back, but took no risks (with fenced animals); so it adopted a policy that allowed only zero-grazing in the area.

In KEA, the Swedish SAREC sponsored the Mpwapwa Livestock Production Research Institute (LPRI), in cooperation with the Agricultural University of Uppsala, to introduce zero-grazing. Under the project farmers had to pay half of the actual costs, to be given a heifer, and they had to return the first female calf. In 1990 the project started with a batch of twenty crossbred cows. In 1992 a second batch of twenty followed and in 1994 another fifteen[11]. This was not enough to satisfy the demand. So HADO allowed farmers to bring in local cows to be mated with improved bulls. In 1993 there were 114[12] farmers practising zero-grazing, only about one third of them had improved cows[13]. The

[8] See Östberg, 1987. p. 13
[9] SUAS, 1987
[10] See par. 3.4.2
[11] Shayo et al.,1994. p.5
[12] Ulotu, 1994. p. 55
[13] Shayo et al., 1993. p.6

demand for improved animals outstripped the supply. In 1993 some 150 farmers were interested[14]; and in 1996 this had quadrupled to 600[15].

However, in 1996 there were only 120 zero-grazers, hardly more than in 1993. Following an external evaluation, Sida support to HADO was stopped. The project was felt to be too much top-down and the evaluators could not see how it could be sustained or be replicated. They advised to bring HADO under the control of the district council. The district council, however, was poor and local politicians were under popular pressure to allow extensive livestock keeping back in the recovered areas. Some promised to allow for the return of livestock during electoral campaigns. Most district administrators envied HADO for the support it was given by Sida and the Tanzanian government. Consequently HADO lacked the finances and the political weight to keep on patrolling the destocked areas and the next step was to hand over its law enforcing function to the villages. These could not handle the pressure from extensive livestock owners and the destocking effectively collapsed. And so did the zero-grazing. SAREC support to zero-grazing was halted in 1996. In 1999 the number of zero-grazing farmers had dropped to eighty two. Only thirty-eight of them had improved animals. The numbers kept falling as the presence of traditional herds suppressed the milk price and increased the disease pressure[16] and the competition for fodder. A number of farmers continued with zero-grazing of Dual Purpose Goats, a practice that was increasingly used outside KEA as well.

In Mvumi a different course of action unfolded. Here a NGO, the Mvumi Rural Training Centre (MRTC), took the lead, supported by two Dutch donors: SNV provided an international expert and ICCO[17] operational funds. The introduction of zero-grazing was its first activity, implemented in close consultation with HADO. In 1990 twelve improved cows were brought in, and in the next two years another twenty eight. From 1991 onwards, farmers were also allowed to bring in local cows. In 1993 the project signed a contract with the Kongwa ranch. MRTC provided Dutch semen and was allowed, annually, to select the best twelve pregnant heifers. The scheme supplied farmers with good heifers throughout the 1990s.

At the end of 1994 there were 131 zero-grazers in Mvumi. Inspired by the then Prime Minister of Tanzania, who was born in Mvumi, the ministry of agriculture initiated the Mvumi Integrated Small-holder Dairy Project in 1996. With financial support from the Japanese government, it aimed at bringing 600 dairy cows. The MRTC was to implement it. After an initial row over the low quality of the cows, it collapsed in 1997 after a corruption scandal. In total it brought in eighty-two animals. Yet, the number of farmers continued to grow due to MRTC's own program and mostly via natural growth. In 1997 the number of farmers was 277, in 1999 it reached 400 and at the end of 2001 it was 522. At that time the number of animals passed the one thousand mark; 771 crossbreds and 231 local cows.

During my field visit in 2002 the farming system seemed to have been transformed, at least in the western part of the area. Farmers sold crop residues to zero-grazing families or exchanged it for milk or manure. A few people sold their milk in Dodoma town. They did this in the traditional way, using the driver of the bus to pass on the milk to a standard customer. In the biggest villages zero-grazing farmers formed groups at village level. Although they did not have a formal legal status they were able to impose sanctions on their members. Together with the environmental committees of the villages, with some HADO staff and the traditional police ('sungusungu'), they kept extensive livestock out of the area. This was not without conflicts; in one case an intruder was killed. In other cases people were imprisoned or penalised. Bribery was commonplace but zero-grazers seemed to be on the winning side. An important victory was won when the owner of the largest herd sold hundreds of animals.

[14] Ulotu. 1994. p.54.
[15] Ogle, 2002. p. 5
[16] Bwire. Pers. comm.. May 2003
[17] Interchurch organisation for development co-operation

2.5 The significance of the destocking experience

Why is it important to understand the HADO experience? A proper understanding of destocking could be a key-element in coming to grips with farming systems in all semi-arid areas in Tanzania and Africa. When population density increases in these areas, more marginal lands have to be taken into cultivation and usually the poor suffer most from the resulting reduction in labour productivity. Boserup (1964) has described that the only way out of such a poverty trap is to intensify the system: people have to apply new technologies that enable them to apply more labour per unit of land with at least a similar labour productivity. This productivity refers both to the income per hour as well as to the amount of Kcal and protein produced per hour of work. Careful reading of her classical work reveals that Boserup's theory is mostly validated with two innovations: irrigation and mechanisation. In the 1990's the work of Tiffen et al. (1995) on the intensification of the farming system in Machakos, Kenia, added a third option: 'market lead intensification'. Urban centres can provide the incentives for intensification. They offer business opportunities and employment for people from surrounding rural areas and create a good market for agricultural products. In high potential areas one could argue that intensification via organic farming is a fourth option. In Tanzania the Ukara islands in Lake Victoria are a classical example (see Ruthenberg, 1984).

In Ugogo, none of these evolutionary options seem realistic. Irrigation and mechanisation are too expensive; urban markets are far away and organic farming is too labour intensive (as we will see later). In such circumstances increasing population densities can lead to a collapse of the system. Decreasing labour productivity in crop production leads to migration (permanent and seasonal) and a shift to off-farm sources of income. This is the case in Mvumi; migration is very high and, even in average years, farming alone can not sustain the population. Food shortages are chronic and nearly 30% of the children die before reaching the age of five. So although destocking is a dramatic event, the alternatives (if any) are dramatic as well.

So destocking is not just any type of intervention; it might be one of the very few options farmers in areas like Mvumi have to intensify their farming system. And what happened in KEA and Mvumi, can (and will) happen in similar areas in the future. In bigger villages outside Mvumi, families with large herds are often urged to leave the village. The well-known Massai culture is not only threatened by tourism or invading crop producers, but by overstocking as well. It forces households to give up their nomadic lifestyle and settle for crop production. In adjacent Sukumaland, the number of animals per capita, was reduced by sixty percent between 1945 and 1990[18].

All these processes are based on the fact that crop production is more efficient. While in areas with low population densities, ruminants are still useful as an additional source of income and food, in very densely populated areas the problems they are causing (trampling and erosion) are bigger than the gains they bring (milk, meat, manure). So as population density grows livestock is pushed out of the system; not only to conserve nature but to improve the overall productivity. This idea is not easily accepted by agriculturists who are educated with the notion that the ideal farming system is a mixed farming system. Neither is it attractive for social scientist who nurture the romantic notion that the livelihood system of (semi-) pastoralists are well adapted to their natural resources and that traditional lifestyles should, as much as possible, be conserved.

2.6 Perspectives for research in the 1990's

Having a basic understanding of the issues at stake in the process of land degradation, destocking and the introduction of zero-grazing, we can identify the research topics that could lead to a more in-depth understanding of the livelihood systems in the area and to better designed development interventions.

The most critical issue to assess is the impact of destocking and the viability of zero-grazing as an alternative system. This is a hugely complex issue: overgrazing and erosion had a profound impact on many aspects of the livelihood of the people. First of all it affects the production of milk, meat and

[18] Meertens, 2003.p. 166

manure. Secondly is has a direct influence on the area available for crop production and the yields of crops. Thirdly the availability of (drinking) water, firewood and construction materials is affected. Fourthly the prevalence of a number of diseases is directly linked to the livestock system: for example eye-diseases (a major problem in dust prone Mvumi) and malaria.

The decision to destock was a dramatic one and farmers, practitioners, policy makers and politicians do need to conclude whether the painful decision was justified or not. All of them want to know what the impact was on the income of people; what the final balance is in terms of nutrition; what is the balance in terms of diseases? And does the system indeed become more sustainable in environmental terms? How will the role of livestock in social terms be compensated? How will people mobilise labour when they do not have livestock any more? How does destocking affect the balance between better off and poorer families? Research that would generate answers to these kind of questions is considered to be relevant as it can assist policy makers, elected politicians, practitioners and farmers to take better decisions.

Answering these questions one has to distinguish the short term dynamics of the destocking process from the long term underlying principles. Research on the short term impact of destocking could focus on what happened with the evicted animals; research on the long term impact could be to compare the potential productivity of extensive livestock keeping (free grazing) with that of intensive livestock keeping (zero-grazing). Combining the results of both approaches could lead to a balanced assessment of pro's and con's of destocking and possibly on formulating under which conditions destocking and subsequent introduction of zero-grazing could be contemplated.

With these questions in mind we will now review the main clusters of publications on the area. We start with a focus on Kondoa Eroded Area where most research was carried out by research institutes before shifting to Mvumi where NGOs plaid a dominant role.

3 The role of knowledge and research

After an introduction on the pre-1990 research in Central Tanzania (relevant for our study) we will examine three (clusters of) publications. The first focuses on land degradation in KEA, the second on the introduction of zero-grazing in KEA. In both cases Sida-SAREC sponsored research programmes took the lead. In the third cluster we look at Mvumi where most research was done by NGOs or as single, stand alone studies.

3.1 Pre-1990 research on soil erosion and land degradation

Research on soil erosion has a long history in central Tanzania. In 1933 the first experiments were done to estimate soil losses under different land uses in Mpwapwa[19]. Another line of research was to discover which pasture plants combined soil conservation properties with adequate nutrients for use in Central Tanzania[20].

In 1968 the DUSER[21] research project was initiated with the aim to obtain reliable data on rates of soil erosion and sedimentation in Tanzania. Such data might form a rational basis for future schemes of soil and water conservation[22]. The project was implemented by the department of Physical Geography of the universities of Stockholm and Uppsala, together with the Bureau of Resource Assessment and Land Use Planning (BRALUP) of the University of Dar es Salaam. In 1973 a monograph was published: *Studies of soil erosion and sedimentation in Tanzania*. Two papers focus on central Tanzania. One explores the historical anti-erosion policies in Central Tanzania[23] and another provides a detailed quantitative analysis of run-off and erosion in the area[24]. The latter concludes that the need for soil- and water conservation is vast and urgent and a number of recommendations are given, incl. reduction of livestock numbers, controlled grazing, controlled burning, mulching and using ridging.

The DUSER project was one of the first major multi-disciplinary research efforts on land degradation and erosion control. Next to many new findings of considerable scientific interest its conclusions came to play an important role in agricultural planning. Throughout the final report man's activities were emphasized as the most important factor among those which influence the rate and intensity of change of the physical landscape within a historically short time perspective. The studies contributed to the urgently felt need to combat erosion and one of the consequences was the creation of HADO[25].

DUSER was closed down in the early 1970's. In 1981 a next step was taken when Christiansson, a DUSER team member, published his PhD: *Soil erosion and sedimentation in semi-arid Tanzania*[26]. The aim of the study is to describe and analyse factors of importance for soil erosion and to document and discuss the effects of erosion. The report gave an overview of the historical causes of erosion and the precarious balance between crop- and livestock production in the area. The main conclusion was that with the present agricultural system in Ugogo the soil cover on parts of the slopes would be lost *down to bedrock* in 50-100 years. At the end of the thesis a large number of recommendations are formulated on how to reduce erosion: intercropping, mulching, planting less maize and more cassava, plant strips of grasses across plots, terracing, contour hedge planting, ridge cultivation, tree planting on

[19] Temple. 1973. p. 206
[20] Berry and Townshend. 1973 p. 243
[21] Dar es Salaam/ Uppsala Universities Soil Erosion Research Project
[22] Rapp. et al. 1973, p. 105
[23] Berry and Townshend. 1973 p. 241-254
[24] Rapp, A., D.H. Murray-Rust, C. Christiansson and L. Berry. 1973. p.255-318
[25] This assessment of the DUSER project stems from Christiansson, 1922. p. 13 and 14
[26] Christiansson, 1981

steep slopes, controlled grazing (including fencing off some areas and reseeding them), increased use of manure and controlled burning.

The study addresses the main nexus of the agro-ecological system. The quality of the data is excellent and the work is well connected to previous research and publications. Via the large number of recommendations it tries to make a connection to potential improvements in the farming system. The latter part is however weak. Although the recommendations cover half of the final chapter they are solely based on technical research. In some cases this research was done in Mpwapwa; in other cases in other countries. Yet, technical data alone can not be regarded as realistic base for recommendations that have a direct economic impact on the farmers who are supposed to implement them. One example is the usefulness of contour-bunds. In Kondoa these seem feasible[27] but in Ugogo (which covers the lion share of Dodoma) they are not economically viable[28].

A second important publication was "*The Kondoa Transformation*", from Östberg, a Swedish anthropologist. It was based on a Sida commissioned field study into the changes that had taken place in the KEA in the six years following the destocking in 1979. It is a very well written account of what happened during- and after destocking. A large number of positive changes are mentioned: e.g. more vegetation, better water infiltration, new cropping options and higher yields per hectare. Also a renewed social dynamism is described with more perspectives for the young generation of farmers who are no longer blocked in their development by the large herds of the elderly. An attempt is made to asses the impact of the destocking on the surrounding areas where the livestock had been moved to. Indeed this lead to an increase in pressure on the natural resources. The author presents this in the wider context of the expansionist approach towards farming of the dominant ethnic group, the Rangi.

The tone is optimistic. Most people seemed to have accepted the destocking and are eagerly awaiting the re-introduction of animals on a zero-grazing regime, which is already used by a few farmers. No attempt is made (as time was too short) to quantify the impact and to come to an overall assessment of destocking. The paper provides three future directions: more research into ecological transformation, link the results of this with land use planning at village level and introduce zero-grazing.

Both studies played an important role in discussions among donor agencies; e.g. they were extensively quoted in the regional policy papers of SNV, the largest donor in Dodoma region in the early 1990's. Probably they also triggered more interest in the HADO experiment, from scientists.

3.2 Kondoa: land degradation and destocking

3.2.1 The MALISATA program

Setting the research agenda
The Man Land Interrelations in Semi-Arid Tanzania (MALISATA) programme was a proper follow up programme to DUSER. The first ideas were launched in March 1987, during a workshop organised by SAREC[29]. Three aspects were strongly promoted:

- promotion of the interests of farmers, rather than of planners and academics
- alleviation of poverty among the people of KEA
- reduction of gender inequities in the study area.

In the workshop scientists were invited to submit research proposals. Both academic institutes and governmental agencies submitted proposals. In a second workshop, in October 1987, a large number of stakeholders assessed the proposals. The proposals were judged to be of very poor quality. The ones

[27] See a.o. Östberg 1987. p. 40 and Dejene et al. p19.
[28] Holtland, 1994. p. 80
[29] This description is based on Mung'ong'o et al., 2004. p. 12-14

of the Institute for Resource Assessment (IRA; the successor of BRALUP) were the seen as the best and SAREC decided to avail funding to improve their proposals further.

So in this process the research agenda was set by the quality of research proposals. The promotion of farmers' interests, poverty alleviation and gender equality did not play any role. We will see that this had severe consequences. The programme, operational from 1991 to 1998, was implemented by a team of Swedish[30] and Tanzanian researchers and had an anal budget of some 330.000 USD; or twice as much as the Sida support to HADO itself[31].

The justification and the aims

The aim of MALISATA is to contribute to an empirical and theoretical basis for assessing inter-relationships between man and land in a semiarid environment and to support ongoing development projects in the area[32]. An additional aim was to develop Tanzanian research potential and to work in an interdisciplinary way[33].

The scientists explicitly link the research to the destocking: 'To scientifically study the environmental response and the socio-economic adoption of the population affected by such a large scale experiment is both a unique possibility and a responsibility.' And: 'We hope that the studies will contribute to the creation of sustainable production systems, not least by documenting the solutions reached by the local people themselves'[34]. At the same time the researchers question the rationale behind the destocking: 'In fact the reason for the severe land degradation in KEA were not known and still remain to be understood. Are the large-scale tse-tse clearings during the colonial period responsible or the number of livestock as argued by HADO? Are faulty agricultural practices or misdirected state interventions 'deskilling' the peasants or are physical factors the reason for degradation?'

Relevance of results: the first overview paper (1996)

A first overview of the programme is published in 1996[35]; it was based on papers submitted for a seminar in 1993. Fifteen papers are from MALISATA team members and twelve refer to the destocked KEA. Only two of these papers formulate concrete recommendations and those analyse the causes of erosion[36]. They conclude that the accelerated man-made erosion of the last few hundreds years is superimposed on a natural erosion process that started millennia ago when the area was uplifted due to tectonic movements. Although the erosion can not solely be explained by human activities, for all practical purposes it is the most important cause. The authors conclude that the re-introduction of animals in the area should not be contemplated neither in the short, nor in the long term. These findings can be interesting for scientists, for policy makers they just re-confirmed the rationale for destocking; exactly what was questioned at the onset of the programme.

The next logical research questions then should have been, what is the ultimate impact of destocking, what sustainable production systems can be developed and what new local solutions have people been exploring? Although the other papers in the overview describe a range of specific aspects (hydrology, sedimentation of a water reservoir, vegetation development, marital fertility, land tenure) in parts of the destocked area, none of this questions is addressed. Even the simple question whether (and to which extent) soil erosion has been reduced after the destocking is not addressed.

Relevance of results: the second overview paper (2004)

In 2004 a second overview paper was published, written by Tanzanian researchers. This time there is more information on erosion, land use and the introduction of zero-grazing[37]. Unfortunately it is still

[30] A British scientist of the university of Newcastle was involved as well
[31] Rudebjer, 1997. p.26.
[32] Christiansson, C., I.S. Kikula and W. Östberg. 1991. p. 357
[33] Op. cit. p. 360
[34] Christiansson, C., I.S. Kikula and W. Östberg. 1991. p. 359 and 361
[35] Christiansson and Kilula (eds.). 1996.
[36] See: Eriksson, 1996 and Shishira ad Payton, 1996
[37] Particularly the chapter by Yanda and Kangalawe

not possible to come to an overall assessment of the destocking in terms of agricultural production. For such an assessment, one needs to know the changes in the cropping pattern, in the area under crops and the yields. The authors highlight a number of changes in the crop system (e.g. a shift from millet to maize and vegetables), but the impact in terms of family income is not assessed. Data on land use, based on aerial photographs, are provided but they are confusing and inconclusive[38]. The cultivated area increased as newly established sand fans and valley bottoms (previously used for grazing) were put under crops. But how much, remains uncertain. The issue of yields is not treated. Although the authors dwell extensively on issues like maintaining soil fertility, the use of manure, composting and the relation between water infiltration and land use, they do not attempt to assess the impact of destocking on these aspects. The final conclusions are only presented in open statement like 'scarcity of land has driven farmers to adapt more intensive land-use systems' and 'expansion of agricultural land represents significant changes in the land use pattern'.

In terms of off-farm income, they signal that brick and charcoal production are thriving, due to an increased vegetation cover. However, again there is no attempt to quantify the impact.

In the final chapter nine recommendations are formulated. Most stress the need to continue the destocking and the conservation efforts. Two encourage off-farm income and indigenous techniques. However these do not bear any relation with the research carried out and nowhere is there any proof that people who work off-farm or use indigenous techniques are better off. The last two are:

- research on viable technological innovations and cultural changes that are compatible with sustainable natural resource use in the context of KEA
- assess the suitability and sustainability of fragile and vulnerable parts of the landscape before they are allowed to be used for agricultural expansion.

These are remarkable recommendations, as one would expect the MALISATA programme to have looked into these issues.

Conclusions on the relevancy

The programme did not come up with any finding that could be (made) relevant for HADO or other practitioners. The evaluators confirmed this in 2000. They asked the opinions of practitioners who found little of practical use[39] and labelled the work as 'academic research that was not-relevant'. The Tanzanian researchers agree with this. In their final conclusions they write: 'The district and project management felt that the MALISATA programme should have provided some guidance on the reintroduction of livestock in KEA. The needed some guidance on the livestock units per unit area to be allowed in the area. Guidance was also needed on the number of people to be allowed back in the area. Unfortunately this information was not available, partly because the research results had just started to be assembled[40]. In any case the data may not have met the demand because it had not been collected to meet those requirements. Many studies aimed at attaining scientific excellence and overlooked the importance of the distillation of practical solutions'[41].

When the Swedish MALISATA team was confronted with the findings of the evaluation it protested strongly. The project leader wrote 'We have *mainly seen* the support to the MALISATA programme as support to building and consolidation of our respective research environments'. This is not correct. As we have seen, initially capacity building was described by the same author as an *additional* aim,

[38] The cultivated area increases in one village after destocking (table 8.2a) and decreases in another (table 8.2b); no explanation is given. In the first table the area classified as severely eroded did not change after the destocking while the area of 'bare land' in the second table dropped from 23% to 0% within ten years after destocking. Again no explanation is given. Data on a third village can not be interpreted, as it is not clear whether it is situated in-or outside KEA.

[39] This does not deny the fact that in one case a PhD study lead to a change in the plans of the local administration to move part of a village out of a catchments area

[40] Here and elsewhere the researchers suggest that time was too short to deliver practical results. This only seems to underline their detachment from reality. HADO collapsed nine years after the first workshop on research in 1987!

[41] Kikula et al. 2004. p. 167.

while the *more urgent* need was to ensure that research findings are utilised to help improve living conditions for people living in the research area[42] (emphases added, GH).

The reasons for the limited relevance can be deducted from the evaluation: 'In theory MALISATA provided an ideal situation to assess potential problems linking research and conservation activities. However, the insufficient stakeholders' participation made it difficult to decide on priorities. Proposals were prepared by individual researchers.' The last point is critical. The evaluators did not consider it appropriate for the scientists to decide on the research agenda. Yet, researchers take the opposite view: '…. *independent* research is required. *Commissioned* studies can be useful to support project activities, but what characterises the present programme is that the studies might be adjusted as we learn[43].' It seems that the independency went too far in this case. A steering committee, including policy makers and practitioners, would have asked to come with more practical and relevant research.

Particularly striking is the lack of any economic analysis; the more so if one reads an older publication of Prof. Christiansson, one of the programme leaders: 'Thus it is important to create consciousness about the need for soil and water conservation. One way to reach that goal is to demonstrate how yields improve as a direct result of soil conservation work'[44]. The present author has brought this topic up in informal discussion with MALISATA staff in both 1993 and in preparing this paper. The answer is that they agree that the lack of agro-economists caused a gap in the programme, but that they never managed to find them. They maintain that when the research proposals were submitted, there were no good proposals from economists and agriculturalists. Yet, other proposals were also weak, but in their case Swedish experts upgraded these. Apparently there were no Swedish agricultural economists interested in the programme[45] and the team never pulled its full weight in the battle to find them. If the research would have been commissioned such an omission would not have occurred.

As it went, the impact of MALISATA on policies and practices was very limited. Despite the many efforts of scientists to share their findings with policy makers: they often talked to HADO staff, to village- and district administrators and translated their findings in Kiswahili. Some of them were certainly well connected. The problem however remains that they could not deliver the information decision-makers desperately needed: the overall impact of destocking and strategic ideas on how to make optimal use of the regenerated natural resources after the destocking.

This does not mean that the findings can not be useful in a scientific or development debates. The study of Östberg on the contradictions in participatory planning at village level contains very valuable, general lessons for development programmes. And one can imaging that a study into the recovery of the natural vegetation generates new insights in the role of fire, in absence of grazing pressure, in preventing grassland in semi-arid areas to turn into bush. And so forth… On the other hand: what are the chances that such findings will lead to different practices and policies elsewhere in Africa if they did not do so in Tanzania?

The capacity building in MALISATA can be seen as a success: next to four Swedish, seven Tanzanian students completed their PhD. At least sixty times a Tanzanian co-authored a scientific publication. But again: what is the usefulness of a PhD for Tanzania if it did not manage to contribute to important decisions that are closely related to their research? The ministry of agriculture also raised this issue during the evaluation, when they insisted on the need to build "*practical* research capacity".

[42] Christiansson, et al. 1992. p.360
[43] Christiansson, Kikula and Östberg. 1991. p. 361
[44] Christiansson, 1988. p. 154.
[45] I witnessed a comparable situation in 1995 in the Netherlands when the disciplinary composition of a long term multi-disciplinary research programme in Ivory Coast was determined by the interest of different faculties of the Agricultural University in Wageningen, rather than by the local needs

3.2.2 Eroded consensus and the collapse of destocking in KEA

We have not arrived at the final twist. In 2000 Östberg published an analysis of the destocking experience in KEA[46]. He describes how the consensus on destocking eroded over time and that this threatens to annihilate all efforts of HADO. In the 1980's the consensus between policy makers, donors, scientists and practitioners was that to tackle the problem of land degradation the national government had to intervene. The consensus was based on four notions:

1. soil degradation was very severe and threatened the very existence of people in the area
2. overgrazing was the main cause of the severe degradation
3. the local population will not be able to organise the necessary reduction in livestock numbers
4. national level politicians and administrators have to organise a forceful destocking as local politicians could not be expected to withstand popular pressure against such a measure.

In 1996 this consensus broke up. The immediate reason was a Sida evaluation of HADO, but the underlying reason was more profound. In the first half of the 1990's the international aid community was pre-occupied with the concept of participation and top-down approaches like that of HADO were seen as outdated and unproductive. The key paragraph in Östberg paper is: *'Whereas scientists who have studied the situation hold definite opinions about what is and is not possible to do in KEA and are worried what is rapidly getting out of hand; foreign aid workers tend to be more preoccupied with whether the HADO project has been innovative in recent years and whether its institutional setup is in line with current development thinking.'*[47]

In this case, foreign aid workers, refers to the Kondoa Integrated Rural Development Programme (KIRDEP); a project of the Dutch government, implemented by SNV. In 1994 it had become the dominant policy factor in Kondoa. In its formulation report of 1991, forced destocking was assessed as being not replicable[48]. And as the issue was assessed to be politically sensitive, the project decided not to work in KEA, but to start with a study into the role of livestock in other parts of the district. The aim was to address overgrazing via an integrated and participatory land use planning process, which would avoid forcefully destocking.

When the project started the livestock study however was postponed. The project undertook a study to identify the different agro-ecological zones and it looked for ways to improve the productivity and marketing of crops. If found very limited potential. Only some years later (after an evaluation) livestock was taken up again, but it did not touch on the KEA, where, by that time the consensus was broken up any way. From the beginning KIRDEP focused more on participatory planning and on decentralising government functions. It trained people to develop their own village development plans in a participatory way and it trained government staff to assist people in implementing these. In this logic, there was no need for research. If villagers saw land degradation as a major problem, this would become apparent in their plans. As Östberg points out, this undermined the consensus that prevailed until then, particularly the third point: farming communities are not able to tackle overgrazing issues by themselves. With the HADO experience at hand, it was very unlikely that any village would invite the government to assist them in planning their livestock- or land use system.

Intermezzo: participation versus understanding the system

It is good to shed some more light on this issue, as it is fundamental for our paper. The anthropologist of MALISATA, Östberg undertook an interesting study on the relation between farmers and their environment in the Burunge hills[49]; an area outside KEA but in Kondoa district. He shows that farmers and outside experts have different perspectives and priorities in land conservation. Local farmers see erosion as a normal fact of life. It has to be dealt with, but in a way that does not disturb the land, nor the relations with neighbours. The most common measures to limit erosion, are zero-tillage techniques and cultivating on temporary ridges which are re-constructed every year.

[46] Östberg, 2000
[47] Östberg, 2000. p. 257
[48] Mattee et al. 1991. p. 21
[49] Östberg, 1994 and 1995.

In 1994 a Participatory Village Appraisal team of KIRDEP came to one study village, to identify the 'local needs'. Their report included soil conservation as one of the issues people had raised. However when Östberg talked to members of the village council, it became obvious that support for soil conservation was of little interest to them. They were much more interested in construction materials for schools and a water reconnaissance survey that were promised in the same meeting. But they had learned that saying something negative on soil conservation in public plays out badly. So when the issue was raised (by two affluent, immigrant farmers), they had kept silent. Initially this tactic seemed to work: no farmers came forward to ask project assistance on soil conservation. But when one did ask support in making infiltration ditches, it resulted in a conflict.

Infiltration ditches are permanent structures, which means that livestock can not enter the field in the dry season, as they would destroy the structures. In this case one of the neighbouring farmers sent his livestock immediately to the field, even during the construction of the ditches, in order to re-assure his rights. The issue ended in court. It scared the village away from more conservation efforts as it had underlined the fear that it disturbed the community: it leads to more private ownership of land and it bears a risk for more government interference. Some saw infiltration ditches as a first step in a process that ultimately would lead to destocking; a very unattractive prospect for livestock owners.

The then-teamleader of KIRDEP remembers[50] the study and remembers that his staff talked about it. They saw things differently. First of all, the so-called KIRDEP activities were actually activities of the field-staff of the district council supported by KIRDEP. This seems a futile difference but it is essential to our theme: the eroded consensus on the role of knowledge. In the 1980's the (implicit) consensus was that development projects should first come to understanding the farming system before they would intervene. In Dodoma the Integrated Regional Development Programme from GTZ was an example. In 1984 it published a nine-volume analysis of the farming system[51], that was to be the base of a new project. But this project was never started. It was this kind of experiences (huge investments in research and no action) that lead people like Collinson and Chambers to advocate more rapid and participatory assessments and from there to proceed with a permanent dialogue with the target group.

In Dodoma KIRDEP adopted this participatory approach and combined it with the idea that projects should improve the functioning of local institutions, rather then creating their own implementation capacities. So KIRDEP did not direct its attention to technical matters, but to the planning and implementation process of the district administration. And the participatory planning process was iterative. So for KIRDEP the essential issue was not whether a first field intervention in a village was correct or not, but whether the process of participatory planning was improving permanently. The aim of the first participatory village appraisal as reported by Östberg was meant to created a positive relations with the farmers, more then delivering concrete results.

This account shows that the communication between KIRDEP and the scientists was not fruitful. The study proved not only that the intervention in this village worked out wrong, but most of all that the process itself was flawed. The Assessment teams had somehow pushed their own agenda, rather then identified the real locally felt needs. Even at village level the need to confirm the dominant policy narratives is felt. Farmers tell outsiders what they think outsiders want to hear. And outsiders hear what they want to hear. At field level the bottleneck of the approach was both a lack of understanding the local farming system and a lack of capacities to reconcile technical issues with social ones. The field-staff are trained technicians and have a too low level of education to transform themselves into socio-political sensitive change facilitators.

Here we touch on a key-problem in rural development. The best-educated people do research or are involved in policymaking and management. They generate guidelines and approaches that have to be

[50] V.d. Wal. Pers.comm.
[51] AHT, 1984

implemented by the least- educated and least paid field workers. But the latter have to do the most difficult job. It is easier to conclude that infiltration ditches reduce erosion, but, as we have seen, it is much more difficult to understand the farmers' perspectives on this and to actually assist them in establishing them at the right place and time.

The central message of Östberg, is similar to our paper: outsiders who want to contribute to improving the lives of the poor, need in-depth insight in local perceptions, indigenous knowledge and local relations. The paper is special as it shows that when scientists do bring in relevant ideas, practitioners do not automatically take these up, blinded as they are by the dominant policy narratives.

Back to the main line of our paper

Scientists contributed to the erosion of the consensus as well. The MALISATA programme itself initially questioned point two of the consensus: overgrazing was the main cause of land degradation. Secondly the programme failed to maintain the momentum with generating new perspectives on land degeneration. To understand how this could happen, we have to widen our scope to the international discourse on erosion and development. In the 1970's and 1980's it were the scientists who put soil conservation on the agenda. Their dominant policy narrative was that overpopulation and overstocking lead to environmental degradation that threatened the very existence of mankind. The DUSER project must be understood as part of this movement. And as we have seen, the participating scientists claim that this research was one of the reasons to create HADO[52].

Yet, when in 1990 scientists were given the opportunity to do more research in the context of HADO, the dominant policy narrative had changed. The alarming analyses of the threat of soil erosion had been countered by other scientists. Some showed that higher population densities do not automatically lead to soil erosion. The publication of Tiffen et al. on Machakos (Kenya) captured this in its' title: *More people, less erosion*. It became a new landmark in literature on land degradation. Other scientists were inspired by the 'farmers first' approach of Chambers who showed that farmers often did develop appropriate responses to soil erosion problems. Thirdly it was increasingly recognised that soil erosion was as much a social issue, than a technical problem. On this point, Blaikie was very influential[53].

So in the early 1990s' the dominant policy narrative on land degradation was that it was a social issue that had to be dealt with via a bottom up approach. It is against this background that the MALISATA programme promised to look at both technical and social aspects. And it promised to 'document the solutions reached by people themselves'[54]. This context also explains why Swedish PhD candidates were not very eager to work on the HADO project; an old-fashioned, top-down project that would make it very difficult to work in a participatory way with farmers. So those Swedish PhD-students who focused on social aspects of land degradation worked outside KEA; in areas where more modern Swedish projects were active. Those who focused on physical aspects did this inside KEA.

This left Tanzanian PhD students and scholars working on the social and developmental aspects in KEA. Although the evaluation report does not touch explicitly on this topic, it says: 'The impression existed that northern researchers dominate the research agenda at the expense of development concern of Tanzanian colleagues.' Unfortunately the evaluators concluded also that the quality of the papers of Tanzanian scholars was lower than publications that were co-authored or from international scholars. Two explanations are given: the peer-review process was virtually absent for Tanzanian scholars and they had a very strong financial incentive to be in the field, rather than to improve their publications.

[52] Christiansson, 1992. p. 62
[53] Blaikie, 1985.
[54] Christiansson, Kikula and Östberg. 1991. p.361.

3.2.3 Mission creep at the IRA

Let us turn our attention to the Tanzanian scientists and their share in eroding the consensus. The IRA, Institute of Resource Assessment (and it precursors BRALUP) has been involved in the research for decades. One of the MALISATA coordinators is Prof. Kikula, then director of the institute. He has been a fervent advocate of destocking and as chairman of the National Environmental Management Council he personally did his utmost in 1997 to prevent the erosion of the consensus[55]. Still, the IRA (without Prof. Kikula's involvement) contributed to the erosion of the consensus.

In 1997 two of the four contributors to the WB report: *Land degradation in Tanzania. Perception from the village*[56], were key-staff of IRA (one being director at that time). One of the objectives of the report was to contribute to better policies and understanding of land degradation programs. The study focused on Kondoa district and was done in four villages, one being Haubi, the main village in the destocked KEA. A survey was held in spring 1996 among 50 families per village.

The report fully fits in the policy narrative of the 1990s'. Farmers' perception of land degradation was to be the starting point for analysis. So a questionnaire was developed; it had 83 (!) questions[57]. We are interested in only four of them:

> Question 59: Do you have shortage of pasture or feed for livestock?
> Question 60: If yes, which are the critical months?
> Question 61: How do you deal with this problem?
> Question 62: If you have shortage of pasture, do you think that decreasing the number of livestock will help solve this problem?

In analysing the data from the survey, the report concludes that 'All sample villages are experiencing a shortage of pasture and livestock feeds in various degrees'. The very interesting question 61, on how farmers think to deal with this, is however nowhere addressed. In stead, the analysis focuses on people's opinions on destocking. 'Even with the apparent shortage of pasture reported, the majority of farmers indicated their desire to maximise herd size. Farmers were not given any compensation for the loss they suffered by destocking nor were they aware of any perceptible benefit.'

The latter statement is not challenged in the report. But how can the idea that destocking has not lead to *any* benefit, be reconciled with the reality of the transformation that all knew to have taken place? One does not have to be in favour of destocking to observe the dramatic changes in vegetation, less erosion etc. This question becomes even more pressing when we read one of the authors, Dr. Shishira, in a previous paper: 'Return of livestock to these area should not be contemplated in either the short or the long term[58]?' The authors try to explain the lack of *any* benefit by explaining that the introduction of zero-grazing had failed. They conclude that zero-grazing was not widely adopted because it requires too much land, labour (particularly of women) and cash and because there is no market for the milk. These arguments are based on a single study (Kerario, 1995) that is flawed in many ways, as we will discuss extensively below[59]. And they present these arguments at a time that 600 farmers had expressed their interest in zero-grazing[60].

The most striking element of this paper is the changing role of IRA-staff. Natural scientists started to work as social scientists, surveying public opinion and drawing conclusions from that. The only plausible explanation for such a 'mission creep' is again a change in the policy narratives on natural resource management. In the second half of the 1990's neither the WB, nor other donors were

[55] Östberg, 2000. p.201
[56] Dejene et al. 1997
[57] Imaging the poor farmers who had to go through all of these
[58] Shishira and Payton, 1996. p. 43
[59] See par. 3.3.2
[60] Ogle, 2002. p.5

interested in 'Malthusian stories' about overstocking; they were interested in 'farmers perspectives on natural resource management'. However the scientists could not reconcile their own knowledge with the farmers' perspective and apparently saw no other way out than to ignore the whole discussion and limit themselves to the conclusion that farmers do not like the destocking and that a more participatory approach would be needed; a disappointingly superficial conclusion after decades of research by IRA. Indeed the report lead to strong reactions from other scientists, who must have felt betrayed by the unsubstantiated change of opinion of their peers[61]. On the other hand, this WB-paper shows exactly why more relevant knowledge on improved land use and zero-grazing should have been generated by MALISATA (and by others): to prevent international policy narratives to dominate local debates.

3.2.4 The latest fashion reaches KEA: institutional economics

In 2000 a DFID funded research project looked into natural resource management in semi-arid Tanzania and selected KEA as one of the areas for investigation. The focus is on how common pool resources are managed and pastures is one of these resources. The study focuses on 'institutional economics' a field of inquiry that rapidly gained prominence in the 1990s' when good governance became to be seen as the key to development and when Douglass C. North received a Nobel price for institutional economics. The key-question is: What are the costs and benefits of different institutional arrangements; in this case pertaining to the management of common pool resources. Six research question were formulated, but we focus on the first four:

1. Is there any problem with the management of the resource?
2. What are the benefits if the management could be improved?
3. What are the costs, particularly transaction costs, of improved management?
4. Which management would be most appropriate: private tenure, community based NRM, regulation by outside authority or the use of licences for specific use of the resources?

The researchers administer a questionnaire to the villagers of Bolisa in KEA, undertook a PRA and reviewed the literature on HADO and destocking. The questions were mostly qualitative in nature and therefore they lead to qualitative answers only. The research team concluded that the destocking was not based on an adequate analysis. A 'decision support analysis' should be used that would make 'the relative merits of different courses of action transparent'. Unfortunately, nowhere the researchers indicate what kind of data would be needed for this decision support analysis and how such data could be obtained. Secondly they conclude that 'the costs of monitoring and enforcement of bylaws created by the HADO project to control grazing and burning are more than can be sustainably maintained by the villagers'[62]. This reconfirms the third pillar of the consensus of the 1980's: the central government has to intervene to make destocking effective.

Unfortunately also these scientists did not consider the Mvumi case. By that time there were severe conflicts between owners of herds of traditional livestock on the one side and zero-grazers and crop producers on the other. And the latter were winning the battle. If the scientists would have known this, it might have altered their conclusions or at least given them much more insight.

3.2.5 Finally: MALISATA turns to Mvumi

In 2003 the PhD thesis of a Tanzanian student was published: *Food insecurity and coping strategies in semiarid areas*[63]*. A case of Mvumi in central Tanzania.* It is part of the MALISATA and destocking seems to have plaid a role in selecting Mvumi as research area: 'the destocking in KEA lead to a number of adjustments in the livelihood, notably due to an increase in arable land, a diversification of income via agro-forestry. But, as the agro-ecological conditions in Mvumi are slightly different, there is a need to examine the repercussions of destocking on the livelihood of the people in Mvumi[64].

[61] See Östberg. 2000. p. 257 and the (furious) note of Prof. Kikula in Mung'ong'o . 2004. p. 160-166
[62] Lovett, et al. (2001). p. 34
[63] Liwenga, 2003.
[64] Liwenga, 2003. p. 14

Three research questions are formulated: What are the factors influencing the food situation in Mvumi? How do households respond to food insecurity in both the short and long term? And what are the potentials of locally available natural resources in sustaining the livelihoods of people? Both diversification- and intensification strategies are explored. In the case of intensification, the question is whether this is driven by an increase in population density or by an increase in demand from markets. In the international development discourse, this is hotly debated. As explained earlier, until the 1980's the discourse was that overexploitation of natural resources by a growing population was the main issue. In the 1990's the development discourse followed the world-wide political discourse in stressing the importance of markets. The Machakos case of Tiffen et al., is one example of such market-induced intensification. So the key question seems to be whether changes in the livelihood system in Mvumi were driven by destocking (caused by overpopulation), or by developments in Dodoma town (markets)?

A range of research methods was used: documentary search, aerial photo interpretation, group interviews (using PRA techniques like mapping and wealth ranking), structured household interviews (166 households) and semi-structured interviews. The fieldwork was done in four villages.

Unfortunately many of the data presented are flawed or contradict each another. According to the wealth rankings 63% of the households would own animals. We know that at the time of destocking only 17% had animals and many of them had lost those fifteen years later. The selection of households for interviews was supposed to be ad-random, but 33% of them had a zero-grazing unit while actually six percent of the families in the villages practised this. So this group is more than five times over-represented.

In-depth interviews were held with ten families engaged in income generation activities: bee-keeping, tomato production, beer brewing, salt making and charcoal production. For each activity two families are interviewed and their annual income from these activities calculated. Based on this, the conclusion is drawn that bee-keeping and tomato production provide the highest income and charcoal making the lowest. But in this assessment the costs of the inputs that are needed to generate the income are not considered. All investments in land, labour, equipment and skills are disregarded. This makes any comparison of the income generated useless and calls into question the academic quality of the supervisors.

The main conclusion is that 'the proximity of markets and increased labour availability as a result of the destocking appear to be contributing factors towards increased efforts to intensify agricultural production'. Before we discuss the content: the reader should not get the impression that the changes in labour availability due to destocking were studied. It is simply implied in this conclusion that removing the livestock frees the labour for looking after them. The influence of the market was also not studied; this is a real pity as two of the four villages are substantially closer to Dodoma town and it would be very interesting to see how this influences issues like poverty and food security[65].

The main conclusion is flawed. Four of the five identified elements of intensification are directly related to destocking: bee-keeping and charcoal production increased as the vegetation recovered (which lead to more trees, flowers and bees). Tomato production increased as there is more water to irrigate and livestock no longer destroys the fields, which are always situated near water sources. Salt making increased as it much easier to collect the thin layer of salty-topsoil that is created on sandy soils by an excess of evaporation on land with salty groundwater. Free roaming livestock invading the fields at the end of the rainy season destroy this layer and make it dirty. Only beer-brewing is not directly related to the removal of livestock. So the intensification is much more linked to destocking (and hence to over-population) than to market developments.

[65] For example Thiele, 1984, found that the proximity to Dodoma town greatly influenced the impact of villagisation on wealth differentiation in the villages

A similar misconception occurs when the author observes that many poor households leave part of their land fallow. She concludes that this means that labour is the limiting factor and not land (or population pressure). This is not correct. Here we have to expand our analysis to Maddox, a historian who influenced the author of the PhD study profoundly and who is adamant that colonial policies were designed to undermine the autonomy of the Wagogo. The core of his argument is: Agriculture in Ugogo is labour intensive and the reduction in the amount of labour available meant lower productivity, as cattle owners could no longer meet the requirements of people needing food[66]. This argument is only true if labourers earn more inside Ugogo than outside. Maybe this was the case in colonial times, but these days in Mvumi the balance is different. Not only due poor policies, but also due to the very high population density in relation to the poor natural resources.

When population pressure is low, labour productivity is high as soil fertility can be maintained by leaving land fallow. Better off farmers can hire their poorer neighbours and reap the largest part of the profit from their labour. In colonial times they were called 'beef and beer capitalists'. Thiele provides an example of this type of wealth differentiation in under-populated areas in Ugogo, as late as the early 1980s[67]. However, as population pressure increases, labour productivity goes down, particularly for the poor who get ever smaller plots of ever more marginal quality and who have no capital to make their work more productive (e.g. for fertiliser). At a certain stage the total production on their own land is too low for survival and they are forced to sell their labour. They can sell this to their better off neighbours, but this becomes less attractive for both of them as the productivity of the land of the rich is decreasing as well. So over time the profitability of crop production has been suppressed in Ugogo.

In this context a survey from the 1980s is very revealing[68]. It found that rich families near Dodoma did not have more land *per capita* than the poor; crop production was, and still is, not a very attractive investment. The final result is that it is more attractive for poor farmers to sell their labour to farmers in better-off areas, than to their better-off neighbours. So, better-off farmers also suffer from the impact of overpopulation (lack of fallow, erosion, trampling etc.). This does not exclude the idea that all suffer from poor policies as well. The latter include the colonial policies, as explained in detail by Maddox[69], but also the disastrous Ujamaa policy of the first decades of independence. This lead to the need for the structural adjustments programme of the 1990s' that had their own negative impacts; for example, it rendered fertilisers too expensive[70].

So the Wagogo suffered and suffer from many poor policies, but the observation that some poor leave part of their land fallow only shows the depth of the poverty. As such it does not justify the conclusion that there is sufficient land, nor that labour is the major bottleneck for the poor. Like in other cases, understanding the forces that determine labour productivity, is the key to understanding the livelihood of people and the basic characteristics of the farming system.

Considering the interesting research questions, the results are disappointing. No attempt is made to provide an overall assessment of impact of the destocking, nor is there any attempt to compare the situation in Mvumi with KEA. At the time of the research, tension ran high rising in Mvumi as livestock owners wanted to return with their herds, while zero-grazers wanted to keep them out. The latter were winning and the study would be a perfect opportunity to identify the factors that lead to such different outcomes of destocking. Why this was not attempted remains a mystery.

Like many others, the author seems to be so busy with the latest development discourse, that the local reality is overlooked. This is reflected in the literature as well. Of the 125 publications used, only 13 refer to Ugogo. And only two provide information on the farming system of the last decades[71]. Those

[66] Maddox, 1991. p. 134
[67] Thiele, 1984
[68] v. Dijk, 1985
[69] See Maddox's PhD dissertation from 1988
[70] See Dejene et al, 1997 and Meertens, 2003
[71] Holtland 1994 and 1996

are quoted a few times, but on many more occasions the data presented there are ignored. This counts for data on population pressure, land scarcity, livestock ownership and even details on labour productivity (incl. those on income generating activities analysed in the thesis).

3.3 Kondoa: the introduction of zero-grazing

3.3.1 The LPRI/SAREC research programme

Aim and justification
The second SAREC sponsored research programme was: Development of Feeding and Management Systems for Stall–fed Improved Dairy Cows on Smallholdings in the HADO areas. The aim was to introduce and monitor upgraded and Zebu cattle in a zero-grazing system in KEA. So next to doing research, the project was responsible for introducing zero-grazing. How the research agenda was set it not clear, but the starting point of the analysis was: 'Dry season fodder supply is the most limiting factor for livestock productivity in semi-arid areas, but the problem can be solved by a combination of conserved grasses and legumes, leaves and pods from trees or bushes and crop by-products and household waste'[72]. It intended to:

- assess the availability of feed stuffs,
- test, develop and recommended simple and cheap methods of supplementation
- improve the nutritive value of low quality roughages (hay and crop residues)
- develop feed packages for the dry and wet season for the livestock.

The project aimed at capacity building as well. Next to Swedish and Tanzanian scientists, also students were to participate, mostly MSc students.

The implementation
Initially the idea was to introduce animals of the Mpwapwa breed in KEA. This was not possible as there were not sufficient animals available. This summarises in two sentences the crisis in Tanzanian livestock research; the Mpwapwa breed was developed as a dual purpose breed. It was to be used for both milk and meat production, and to provide some animal traction services as well. It was developed in the 1930's, but every now and then specific efforts are needed to prevent it from getting extinct. The main reason has been the poor management of the farm at the research station and the interference of high level politicians and administrators who developed a habit of presenting the animals as gift to their peers. So whether a Mpwapwa cow is of any practical use, is hard to say as there is hardly any experience with them outside the research station.

The project created an infrastructure to deliver the cows and advice to the farmers. Then they set out to monitor the management of the animals[73]. In 1991-93 they collected weekly data from 30 farms. The parameters monitored were:

- cow performance (milk yield; lactation and inter-calving period, calf growth rates etc.)
- feeding strategies (amount of feed supplied and its nutritive and chemical composition)
- economic indicators (income and profit from the sale of milk)
- number of participating farmers.

The data collection was carried out by the project staff, while MSc students, Swedish and Tanzanian, adding particular studies to it, which were published as Minor Field Studies. We will first review two of these before we review some publications by (core) members of the research team.

The results: work of students

[72] Ogle, 1990 and Shayo et al. 1993.
[73] All information here is from the summary article of Ogle, 2002

The first Minor Field Study is by a Swedish student[74]. Based on field work at the end of 1992 she analyses the management of 21 farmers practicing zero-grazing. She administers a questionnaire focusing on the feeding regime, takes samples of fodder for chemical analysis and discusses farmers satisfaction with the (economics) of the system. She describes farmers' practices and the conclusions are straightforward: farmers like the zero-grazing system, although it is a lot of work. The fodderplots (a pre-condition from HADO) were not used and nobody made hay (although recommended by the project). Most fodder came from crop residues, natural grasses and some (semi-) planted Elephant grass. Some farmers gave their cows some concentrate but the effect was less then expected.

The second minor field study is from a Tanzanian student[75]. It focuses on the economics of zero-grazing: the income (incl. its distribution) and the labour requirements (incl. the task division within the household). The field data were collected in 1993; twenty zero-grazing farmers were compared with fourteen livestock owners of extensive herds, outside KEA. Unfortunately the report is poorly structured and there is at least one serious mistake in the economic analysis[76]. Still the main conclusion remains valid: zero-grazing is economically attractive. There are no marketing problems. The income per hour is higher than in the traditional system. Women carry a large share of the work for the animals, as they are responsible for collecting water and fodder. Destocking has lead to a more equal income distribution, as well-off livestock owners lost much more than poor families.

The results: publications of researchers

The first publication is an overview of the results of the first few years[77]. After explaining the number of animals on zero-grazing in KEA and their productivity it comes to the main point: the feeding. It explains that farmers do not use the fodder plots as this competes too much with crop production (in terms of land and labour). Then it comes to the solution: the most sustainable solution for the dry season feeding would be the use of tree leaves (e.g. Mulberry tree), crop residues and grasses planted along contour lines. Data are provided on how often these feeds are used and on their nutritive value. In a next step Mulberry is advocated as an alternative fodder species. It is claimed that farmers know it and use it (yet it is not in the list of frequently used feed). Then the reader is informed that the project provided Mulberry-cuttings to farmers and data are given on its (very high) nutritional value.

Then, in the last chapter, recommendations are formulated on a range of topics: making ghee as a way to avoid the expected marketing problems; introduction of small ruminants and poultry; develop a national policy to ensure that livestock densities do not exceed carrying capacity; introduce simple and cheap biogas production systems and forming associations of livestock keepers. Whatever the merit of these ideas, none of them has any relation to the previous analysis nor is any of them elaborated.

Despite this obvious lack of logic, what concerns us here, is a different issue. How did the researchers conclude that Mulberry would be an interesting option for farmers? Are there no other alternatives? The answer lies in a study of the principle Tanzanian researcher on different protein supplements for dairy cows in central Tanzania[78]. The line of thought is that dairy cows need protein supplements in the dry season. In remote villages commercial supplements are expensive so locally available feed resources are needed. Pods of *Acacia tortilis* are identified as the most promising local resource, as it produces many pods and because the tree has some other positive characteristics as well. Next the nutritive value of the pods is analysed. This is good, but the nutrients can only be absorbed by the cows if the pods are first grinded. So, in a final move, a feeding trial is done to assess the economics of grinded Acacia pods and to compare it with another option: press cake of sunflower.

Here things go wrong: in the economic analysis sunflower cakes are supposed to come from town. High transport costs make them very expensive: 45 Tsh/kg. Grinded Acacia pods are estimated to cost

[74] Larsson. 1992.
[75] Ulotu. 1994
[76] the annual income from milk is based on the assumption that a cow delivers a calf every year. In fact the inter-calving period is much longer (about one and a half year)
[77] Shayo et al. 1993.
[78] Shayo, 1992

15 Tsh/kg. And although the sunflower press cake gives a slightly higher milk yield, it will be clear that the economic benefit for the locally available resource, Acacia pods, is higher. Of course this is non-sense; both in practical terms as conceptually. In practice: in villages in Mvumi press cake of sunflower was generally sold at 15 Tsh/kg. Conceptually there is no reason to assume that farmers can be more easily convinced to grind Acacia pods than to grow (more) sunflower. On the contrary; most people do not have the cash to grind their own food, leave alone that they will pay to do this for cows. Trials at the MRTC in the early 1990s showed that it was feasible to stimulate sunflower production, but institutional support would be needed. During my visit in 2002 the MRTC had been involved in sunflower pressing and this was profitable[79].

But back to the main line. Why are scientists, apparently, so biased in favour of grinding Acacia pods? How to make sense of this? Again the policy narratives of the day can shed some more light on this. In the early 1990's the idea that leguminous shrubs and trees would solve all kind of problems in the farming system was widespread. As N-fixing plants they were seen as an affordable alternative to increase soil fertility in a time that chemical fertilisers rapidly became out of reach for poor farmers (as a result of structural adjustment programmes[80]). In the LPRI programme the focus on using grinded Acacia pods was so strong that when they administered a questionnaire on the utilization of local trees and shrubs for livestock, they asked farmers why they did *not* grind Acacia pods. Such a question only exposes the aloofness of the scientists. Most likely the quality of the responses of farmers to others questions will suffer as well from such a question.

A second study looked at the possibility of stripping: the removal of some leaves from cereals before harvesting that can be used as fodder[81]. Research at Mpwapwa station showed that one can remove the (lower) leaves from maize and sorghum before the harvest, without causing yield losses. Yet, this is insufficient to conclude that stripping cereal leaves should be introduced in destocked areas. Again the bottleneck is labour productivity. A time study at the MRTC showed that harvesting the leaves takes five times more time than harvesting grasses from non-cropped areas. As we refer to destocked areas such grasses are abundantly available at the end of the rainy season while the opportunity costs for labour at high at that time. Interestingly the study looked into the labour requirements as well. It also finds that harvesting the leaves is much more (even up to ten times) time consuming than harvesting straw. Yet, it concludes that the nutrient content from the leaves justifies the extra efforts[82]. The idea is 'to make optimum use of locally available resources', but apparently any bio-mass is a more important resource than human labour. The chance that farmers will adopt this innovation seems nil.

The result: an internationally peer reviewed article

Lastly we turn to an international peer reviewed article[83] by three of the core members of the research team. In the introduction the reader is informed that zero-grazing was introduced in semi-arid Tanzania and that it is *necessary* (emphasis added, GH) to provide these dairy cows with alternative source of feed next to the natural grasses. The aim of the study was to identify suitable combination of *grasses from improved pastures* (emphasis added, GH) to optimise the intake of dry-matter, energy and protein for stall-fed, dual purpose cows.

An experiment was done at the Mpwapwa research station with the Mpwapwa breed. Different ratios of feed were given and the intake of fodder, milk production and milk composition were measured. The conclusions were:

- Tropical grasses are potentially nutritious basal feeds when harvested at an early stage.
- Planting legume species will help boosting the quality of grasses
- Combining Cenchrus and Cynodon was found to be the best strategy

[79] Unfortunately corruption at the MRTC caused the support system to collapse in 2002.
[80] See Dejene et al, 1997 and Meertens, 2003.
[81] Shirima, 1994,
[82] Shirima and Wiktorsson, 1994. p.6. (in Shirima, 1994)
[83] Bwire et al. 2003.

- Supplementing the ration with concentrates or browses of leguminous trees increases their crude protein and energy content.

The paper is a dramatic example of researchers drifting away from the local reality. First of all, as mentioned above, the research is done with the Mwpapwa breed, a breed that does not exist outside the research station. Secondly the conclusions seem self evident. Thirdly the necessity for alternative feeds does not exist; we have seen that zero-grazing on existing feeds is economically viable. And lastly, we have seen that all attempts to get farmers sowing grasses failed. So the aim of the research is to optimise the feeding of grasses that nobody grows, to cows that nobody has.

Unfortunately this article reflects very well the basic flaws in virtually all research on animal nutrition in Mwpapwa. Since the 1930's pasture research was done at this station, and since 1947 in nearby Kongwa as well. Hundreds of trials have been done with grasses and legumes; with different cutting regimes and different levels of fertilisation. Tens of thousand of samples have been taken for nutritional and chemical analysis. Yet, in 1993 the director of the Kongwa pasture research station, as well as Prof. Preston, a leading international scientist in this field and well informed on the situation, agreed (in informal talks with me) that this has not yet lead to a single improvement or change in the local farming system.

When we compare papers of Tanzanian MSc students with papers of well-established scholars we see that the former have a much more practical attitude and an open-mindedness that is needed to come to locally relevant solutions. This conclusion supports the notion that higher education and capacity building initiatives can lead to the deskilling of African experts[84].

The outcomes

In 2002 the Swedish coordinator of the LPRI research programme summarises the outcomes[85]. He notes that after 1996 the number of animals reduced quickly and he anticipates that zero-grazing will collapse. The lack of funds to provide more improved cows to farmers is seen as a major constraint. This is strange; the budget of the programme was 2 million USD[86]. An in-calf crossbred heifer costs about 600 USD and half of this is paid by the farmer. Some 55 animals were provided to farmers, so in total the project invested less than 1% of its resources to the purchase of animals.

Another conclusion is that the communication between farmers, village leaders, researchers, extension officer, donors and politicians has been tenuous. The writer postulates that if the socio-economic impacts of destocking and introducing zero-grazing would have been monitored better and if results would have been shared with farmers, they might have been willing to support the transformation process more wholeheartedly. He indicates a number of parameters that should have been monitored, but which were not or only in an ad-hoc manner: crop yields and manure utilisation; labour inputs; economic indicators; wealth distribution; nutritional status of children and gender issues.

One can only agree with this, but one wonders why the scientists did not realise this much earlier? And one also wonders why the research agenda was so much focused on- and limited to- the feeding regimes of cows. And why was the programme not redirected, as indicated in this publication? Or is the intention of the paper to say that more money should have been spent on research? Like in the case of the MALISATA programme one gets the feeling that although the scientists used the unique circumstances of the destocking as a justification for their research programmes, they only fully realised how unique and revolutionary it was, once it was over. In both cases they cry foul over what should have been done better by others, without reflecting critically on their own role in the process. Tanzanian scientists are more aware of this weakness and accept justified criticism. In his note on the

[84] See e.g. McNeil, 2006 and Carton, 2006
[85] Ogle. 2002.
[86] to the budget was 13 million SK (some 2 million USD) for 12 years; Rudebjer, 1997. p.37

collapse of destocking in KEA, Prof. Kikula concludes: We, technicians, have fallen short of providing guidelines on the rational use of the land that has come back[87].

3.3.2 An outsider taking the lead

The lack of a clear economic and social analysis of zero-grazing created a gap that was filled by a study of a Tanzanian MSc student from the Agricultural University in Norway. The paper of Kerario (1995) became very influential. The field work was done in 1991 as 95 households were interviewed; 14 of them had cows on zero-grazing. The aim was to find out what farmers though of the newly introduced zero-grazing and to identify possible constraints to its adoption.

The study is seriously flawed. First of all the sample size of 14 adopters spread over two villages is extremely small. More importantly, one can not even speak of adoption or not, as in 1991 people did not have yet sufficient time to make an assessment of the innovation. Nowhere in the paper one gets the impressions that the author understood that introducing zero-grazing is not just any innovation: it is part of a transformation of the system. It is intrinsically linked to destocking.

Returning to the data; the main conclusion is that zero-grazing requires too much land, labour and money. This is substantiated by data that supposedly show that zero-grazing farmers have more land, labour and income. The data however tell a different story. Yes, zero-grazers have more land, but per capita they have *less* land. Yes, their income from farming is higher, but the farming income capita is *less*. Their total income is indeed higher, due to off-farm income. Only in the case of the labour force do zero-grazers have relatively more people in the productive age groups in their family.

So the adopters have some more people of working age and they have some more off-farm income. They use these recourses to start zero-grazing. In the paper the author conclude that zero-grazing *increases* the wealth differences in the community. This conclusion is flawed in multiple ways. First of all the wealthiest families suffered most from destocking; their livestock was removed. Although poor families might also suffer from the reduced assess to animals, by and large they were the ones who gained most (due to increased crop yields etc.). So most likely destocking lead to a more egalitarian income distribution. Secondly we have to put the terms wealthy and poor into context. The zero-grazing adopter have an annual income of 95 USD per capita; the non-adopters of 75 USD. So both are extremely poor by any standard, and the differences are small by any standard as well.

Two other important conclusions are drawn. Or better, two suggestions are launched: marketing of milk would very soon become a problem and the introduction of zero-grazing lead to an unacceptable increase in the workload of women. The first conclusion has been proven unjust by later studies; it probably never was a real problem. The second one is obvious, yet, the key-question is: do the people who do the work, get sufficiently rewarded? This counts for women, men and children alike. We have seen, in KEA the income per hour was high compared to other activities[88]. Later we will see that this was also the case in Mvumi , where women also thought they had more control over the income from zero-grazed cows than incomes from other sources and where zero-grazing actually contributed to the empowerment of women.

All in all the study is extremely weak. It was done at a very early stage of the introduction of zero-grazing and the author drew a number of far-reaching conclusions that are not justified by the data. When she presented this study in 1993 in a seminar organised by the MALISATA many people (including HADO staff and the present author) objected to it. Unfortunately it became influential in the debate, probably as it confirmed the prejudges of sceptical outsiders. We have seen that the influential (and populist) WB-study of 1997 eagerly quoted it.

[87] Mung'ong'o et al. 2004. p. 166
[88] Ulotu, 1994

The author was influential as well. She was member of the evaluation team of HADO and many of her flawed conclusions return in the report. For example in the summary we read 'Project support though the SAREC programmes in KEA is limited to the farmers who have the ability and resources to adopt the prescribed regime'. And: 'a large umber of farmers are still waiting for a less resource demanding (labour, land and water, (*sic!, GH)*) livestock rearing alternative. There are indications that zero-grazing places additional demands on the workload of women.[89]'

3.4 Mvumi: action research by an NGO

We now turn our camera to Mvumi, where the MRTC was involved in action research: development activities and research were intertwined. The research did not have a specific disciplinary orientation; the agenda was based on the needs that emerged from the permanent dialogue with farmers who participated in the extension programmes of MRTC. Most research was done in cooperation with farmers and with research institutes; supplemented with some trials on the field of the MRTC.

3.4.1 System perspective on destocking in Mvumi

In order to be able to work effectively in Mvumi, the MRTC, created in 1989, needed an in-depth insight in what destocking was about. Surveys, trials, secondary data collection, literature studies and model calculations were done to see to which extend the opinions expressed by farmers could be understood. Since destocking remains a political issue cross-checking of farmers' opinions was essential. And very time-consuming as there are very few issues on which farmers had reached a consensus, particularly in the earlier years.

After four years an attempt was made to come to an overall assessment of destocking. It was not possible to come with a final conclusion, but the major preliminary conclusions were that:

- destocking lead to a decrease in erosions and an increase in the area under crops. This made the farming system more sustainable
- destocking lead to an increase in income for those families who did not own livestock and to a substantial decrease of income for the families who did. The overall balance seems positive and would surely become positive if zero-grazing would be fully adopted.
- zero-grazing is an economically and ecologically sound alternative livestock system. In terms of available fodder all families who had livestock before the destocking could have cows again and the total amount of milk would be the same as before.
- most people considered the destocking as positive.

In exploring the impact of destocking, an attempt was made to assess all economic losses (one-time losses and structural losses) and gains. The outcome was that livestock owners had indeed endured major losses; but this was mainly due to the death and theft of animals at the time of destocking. This could have been prevented. The economic gains in crop production (more fields and higher yield per ha) could well make up for the recurrent economic losses.

A definite assessment on the destocking could not be given as too little was known about the impact on soil fertility, on the vegetation (will all natural grasses disappear when they are not grazed?), on the increase of the area under crops and on yields. Also the balance on the health situation was unclear (more malaria, less eye-diseases?). The most crucial question that could not yet be answered is whether malnutrition increased or not. Data from the hospital in Mvumi seem to suggest that child mortality increased after destocking[90]. However, whether this is temporarily and linked to the transition period or fundamentally, as less food can be produced, remains an unanswered question[91]. Initially less milk is available, but all farmers claim that more grains and legumes are available. In the

[89] SIDA/MTNRE March 1995. p. 2

[90] Pers. comm. with Dr. Michael Burke. Many thanks to him for collecting and analysis the data of the hospital on my request

[91] In KEA Östberg (1987) concluded that malnutrition was reduced (based on some unpublished data) while Dejene et al. (1997) maintain it increased (without providing any data).

long run, zero-grazing could compensate the loss of milk. If crop production increases by 20%, it could compensate the loss of milk and of meat. Farmers estimated the increase to be even higher; partly due to an increase in area (estimated at 10%) and partly due to an increase in yields.

The latter issue is very interesting. Farmers consistently claimed that soils had become much softer; indicting a higher percentage of organic matter and a higher yield potential. Model calculations support the idea that organic matter content could increase due to destocking. This came as a surprise as mixed farming is generally seen as the most optimal system and manure as essential to sustain soil fertility. In Mvumi this might not to be the case. Traditionally Wagogo hardly used manure; most simply moved their kraal after many years and plant crops in the old one. In the 1950's the colonial government started to press them to apply it in their fields. In Mvumi, in the 1990's some farmers still kept large amounts of manure in kraals without the intention to use it. The lack of proper means of transport can explain this partly. Yet, samples of manure in- and outside the destocked area showed that they contained so little N that application of manure on the field would lead to N being extracted from the organic matter soil in the soil into the manure[92]. Indeed, a field trial at the MRTC with manure did not show any positive effect on the yield.

What does this mean for the destocking? The incorporations of N in the soil *could* be more efficient in a system without cows. In such a system crop residues and the natural vegetation are recycled in situ. Bacteria, fungi, insects, rodents, small mammals and termites effectively break down the leaves and stalks and ensure that nearly half of the N is incorporated in the soil before the rest is lost as farmers burn the remaining stalks[93]. Screening literature and talking to experts[94] revealed that this could be possible in circumstances like in Mvumi. This is an interesting example of how field observations and discussions with farmers can lead to a questioning of a commonly held believe.

After the destocking some farmers in Mvumi made contour-bunds on instigation of HADO, but none maintained them. It is difficult to make them, as it has to be done in the dry season when soils are dried out and as hard as concrete. At the MRTC demonstration field some contour-bunds were made and the time needed was measured. It took too much time[95] and calculations showed that it is more attractive for a farmer to dig a contour-bund for a farmer in a high potential area (e.g. in Arusha) than to make one on his own field. The reasons are:

- making the bunds in Mvumi is much more work than in high potential areas;
- despite the low rainfall, yields are often more limited by low soil fertility than by water stress
- the slopes in Mvumi are mostly rather gently, thus limiting the impact of bunds. When land on steep slopes is used farmers do not invest in bunds as it is illegal to use the land and soil fertility is so low that yields will be very low anyway; with or without bunds;
- crops grown in Mvumi have a lower market value
- there is only one season per year, so it takes much longer before the investment pays itself back (compared with an areas with two crop per year).

Outside Mvumi contour bunds are even less attractive as it is very difficult (technically and socially) to protect them from damage by free grazing livestock. Generally livestock owners consider contour bunds in their village as an infringement on their free grazing right[96].

Although the impact of contour bunds on the physical loss of soil has been measured in Dodoma since the 1930's, until today there is not a single publication on the costs and benefits of this technology. But virtually without exception, outsiders (projects, researchers and consultants) recommend farmers to make them. We have seen that in some areas (e.g. KEA) this seems correct; in most others not.

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[92] The very low N-content of manure can be explained by the quick evaporation of N due to the low Ph of the soils, the frequent wetting and drying in the kraals and the strong winds

[93] Holtland, 1994. p. 77

[94] Pers. comm. in 1994 with Prof. Breman and Dr. Budelman of the Agricultural University in Wageningen.

[95] And often the costs of maintaining contour bunds are even higher than the initial investments; see Burger, 2003

[96] See also Östberg, 1995 and the discussion on this above

3.4.2 The introduction of zero-grazing

We now look at research related to zero-grazing. The methods applied included field trials with fodder crops, labour studies and model-calculation on the number of cows that can be kept on zero-grazing. The main publication was Holtland (1994) while some results were already presented in the MALISATA workshop in 1993[97].

MRTC used the system of 'passing on the gift'. People who were given a pregnant heifer had to pass on the first and third female calf to other farmers; at the age of six months. Those we were given such a calf had to give back a similar animal. Village level committees selected the recipient of the animals. Applicants had to have a proper stable, a plot of fodder and had to complete a short training. If more families qualified than animals available, a lottery was organised among all candidates.

In the first year twelve animals were given to relatively well off families, as nobody knew if an average family would be able to sustain an animal. They built stables with corrugated iron sheets and sometime with brick walls. Many employed a young boy to look after the animal. Closely monitoring the progress in the first year showed that:

- feeding the animal was not so much of a problem
- the planted fodder plots all failed; even the MRTC demonstration plot
- most stables were unnecessary expensive
- the cows of poorer farmers performed better as the poor looked better after their animals. Employing youngsters was often not very efficient.

The findings were translated into action: the pre-condition to plant fodder was abolished (in consultation with HADO) and a target-group policy was formulated. People with a formal job were no longer eligible. They had to buy cows commercially. And some did. Farmers with a herd outside the destocked area were excluded as well; they were encouraged to bring in a local cow. And many did. Women were targeted; at least half of the animals were to be given to women. Half of those were single head of households. The hope was that this would empower women. And it did. In one village a woman who received a pregnant heifer was elected chairlady of the village[98]. This move in 1993 had a long term impact; in 1997 forty eight percent of the 277 zero-grazers in Mvumi were female. Lastly, a policy was designed to cover all (13) villages in the area by 1996.

The findings that the stables initially constructed were expensive, was translated in a participatory exercise to design an appropriate stable. All candidates for the second season visited the stables of the first batch of farmers. Based on what they saw and what these farmers told them, a 'standard stable' was designed, using only local materials. The cash expenditures for a stable dropped from 14.300 Tsh. in 1991 to 2.800 Tsh. in the 1993. Until today virtually all farmers use this design.

The milk recording system showed that the amount of milk that zero-grazers could sell per lactation of 1.5 years ranged between 1.500 and 1.800 litres. A labour survey showed that 870 and 690 hours are annually needed for resp. fodder and water collection[99]. Combing these data with the capital investments, zero-grazing proved economically viable. Women did the lion-share of the work, but as the income per hour was above what could be earned in crop-production, they did not mind. A study from a British and a Tanzanian student revealed that married women felt they had more control over the benefits of a zero-grazing cow than they have with traditional herds[100]. And as most labour was needed outside the peak periods of crop production, zero-grazing was a very good way of making optimal use of the available labour.

Ecologically zero-grazing was very attractive as it was a way of making use of the available natural grasses and crop residues that otherwise would mostly be burnt. The question however was how many

[97] Published in Christiansson and Kikula, 1996
[98] Unfortunately, subsequent manipulations by the 'strong men' of the village prevented her from taken up the position
[99] Holtland, 1993. So the efficiency was about one third better than estimated by the SUAS mission mentioned in par. 2.4
[100] Edwards, 1993

animals could be sustained in the area? If all crop residues would be used for zero-grazing, 3.500 animals could be fed. This means that at least as many households that used to have animals before the destocking, could have them again. Some 2000 people would be employed and the amount of milk produced would be substantially higher than the amount of milk produced before destocking[101].

The final impact of all research-based modifications of the programme was that zero-grazing became within the reach of normal families. By the third season most people were convinced that an average (or even poor) family could handle a zero-grazing unit. Until 1995 the main imputes came from the donors of the MRTC. To ensure the sustainability, from 1996 onwards people were asked to pay for a heifer; 50.000 Tsh (about 90 USD; about the price of a local cow). This made it difficult for the poorest of the poor; but not impossible for families with average incomes; e.g. data from Liwenga in 2000 show that twenty six percent of the zero-grazing families, had no livestock before destocking.

3.4.3 Stand alone studies

Food security survey
In 1999 the Food Security Unit of Save the Children Fund published a household food economy assessment of Dodoma[102]. The aim of the project[103] was to get a better understanding of coping strategies, with emphasis on off-farm income generation. The methodology consisted of a review of secondary data, PRA-techniques and rigorous semi-structured interviews. Eight agro-ecological zones are distinguished. One is Mvumi division and we will focus on the results there and compare it with the results of the surrounding area.

First of all three wealth groups are defined by interviews with key-informants. In Mvumi 15-25% of the households are considered to be wealthy; 25-35% to have a middle income and 45-55% to be poor. The wealthy typically own 33 cows and the middle group 8. This suggests that people owned 66.000 cows, or more than double the amount of animals that were expulsed in 1986. And although data on livestock must be treated carefully, these estimates are a far cry from reality. It reflects the tendency of the Wagogo to depict their society as a livestock based one, more than anything else.

The data on the sources of income of the different groups show that in Mvumi:

1. rich households earn about 45% less than their colleagues from neighbouring areas.
2. middle income families earn some 15 % less then their colleagues elsewhere
3. poor households earn about 40% more than their colleagues outside the area.

These findings confirm the calculations of the MRTC: the poor gained from destocking while the rich and the middle group lost out. A second finding is that the poor in Mvumi are less able to sell their labour to the rich, as the latter have less livestock to pay them. However this is more then offset by the higher off-farm incomes from making salt, selling firewood or brewing beer. The poor outside Mvumi overwhelmingly rely on selling their labour to livestock owners, but their wages drop quickly when rains are poor. The third finding is that households in Mvumi keep slightly more grains in store than those in other areas (as they can make less use of livestock as a saving mechanism).

Although the study is the only one that compares the destocked area with the surrounding, the authors do not analyse these findings in the light of destocking. Their aim is to assess the amount of food needed in each zone for the coming hunger period. This is used by the sponsors of the project, who were contemplating to provide food relief or not. However, the indications are still very rough; like an expected shortage of 20-30% in Mvumi and the conclusion that “zone IV, VII and VII are most vulnerable to food insecurity due to agro-ecological and economic factors” is a well know fact for all inhabitants of Dodoma. The study would have been much more useful if the findings were compared

[101] Holtland 1994, p. 74
[102] SCF(UK)/ Mathys, E. 1999..
[103] funded by ECHO, WFP and DfID

with the (annual) food relief efforts of local NGOs; e.g. the Anglican church. How do they normally assess how much food to bring? Which criteria do they use to supply relief food? Are these in line with the findings of the study? How could the selection of recipients be improved? What has been the impact of previous relief efforts etc.? None of this is done.

Innovative farmers

In 1997 - 2000 researchers from the Free University of Amsterdam implemented the Promoting Farmer Innovation project that was funded by the Dutch government and coordinated through UNSO[104]. The aim was to stimulate technical innovation in the field of land husbandry via exchange of experiences, capacity building of farmers and their organisations to experiment and innovate, and via promoting a policy dialogue to create a favourable environment for rapid adoption of improved resource management techniques. With a budget of nearly one million USD it operated in Kenya, Uganda and Tanzania. In Tanzania the Dodoma region was selected and in Dodoma the Mvumi division. Mutunga and Critchley (2001) describe two innovative farmers from Mvumi.

The first one, Albert Muhembano, is digging in organic matter in trenches of 60 cm deep and 60 cm wide and renewing this every four years. Digging such trenches and adding organic materials is the standard technique for growing grapes; the innovation is that now food crops are grown in this way. It is very labour intensive: according to the farmer 400 mandays/ha are needed (so 100 mandays per year). The farmer estimates that the yield increases by 50%. In normal fields farmers invest about 600 hours per ha. So an additional of 50% could justify 300 hours per ha. This would give a working day of 3 hours. In practice it will be at least double that amount. Or it in other words, labour productivity is probably about half or less, of the already dismal productivity in normal fields.

The second innovation comes from Grace Bura, a woman farmer. She practices gully healing. She starts with trash and soil, plugged with some stalks along the contours in the gully heads. Then she plants crops in the captured sediments to consolidate the gain. In this way she manages to prevent gullies from deepening further and in some cases the gully can be healed completely. Of course this is not an innovation. Worldwide farmers try to heal gullies on their land and they use all possible ways to achieve this; it would be rather strange if farmers would not do this.

So the innovation is not innovative and it is not put into its context as well. It seems logical that gully healing has much better chances in destocked areas like Mvumi; but destocking is not part of the analysis. It is simply not mentioned. Moreover the real innovation of Grace is only mentioned side-ways, without any further comment: ‘A few years ago Grace bought a dairy cow for herself’ and, ‘If the maize does not yield cobs she will feed it to her stall-fed cows’. The authors seem to think it is normal for people to have cows on zero-grazing in Dodoma. Actually the authors knows Grace very well. She did not buy a dairy cow. In 1991 she was, with her husband, the first to take a local Zebu on zero grazing. Throughout the years this cow, and her offspring, were served by dairy bulls. And although they were unlucky with having relatively many bull calves, in due time they managed to get some crossbreds with a reasonable milk yield.

Again a sobering story: researchers try to identify innovative farmers, but they do not manage to recognise them; even not when they meet revolutionary innovators like Grace Bura. They only found what they (apparently) wanted to see. There are several lines of defence for such omissions. In the introduction of the publication the authors seem to apologise for the shortcomings described above:

- ‘some innovations are very labour intensive and not economically valid’
- ‘it is true that several innovations are merely a variation on well know techniques’,
- ‘the presentation of isolated technologies does not do full justice to the integrated package of initiatives that many farmers are developing’.

These apologies go a long way to disqualify the exercise. Again we run into the difference between what scientist seem to promise and what they deliver. The sub-title of publication is ‘Promising

[104] This section is based on Mutunga and Critchley, 2001

technologies for the drier area of East Africa'. But what constitutes 'promising' is never defined. The donors and the public will think that these are innovations that fit in the existing system and that are economically viable or will be so, in the not too distance future. Yet, apparently these scientists do not see it as their task to check this. But if it is not their role to asses the viability of a technology, an to put it in a system perspective, what is their role? If scientist do not make a thorough analysis, who else has to do this? These are serious questions. Several projects and organisations in Dodoma promoted similar 'promising innovations' aiming at 'soil conservation' or 'integrated nutrient management'. We have already seen (in 3.4.1) that the much-advocated contour-bunds were not a realistic option in Mvumi. MRTC also assessed the viability of making compost; it proved too laborious [105]. Similar problems are reported from Sukumaland, where for decades experts recommended labour intensive technologies, without ever measuring their labour productivity[106]. In our next paragraph we will meet another example.

Alley-cropping

In 1998 a Tanzanian MSc student of a Norwegian university published his thesis on the adoption agroforesty in Dodoma[107]. The main objective of the study is to document that "modern agroforestry" technologies are not widely practised among peasants in Tanzania, and to clarify the reasons for this. The thesis starts with an introduction on the potential benefits of agro-forestry, particularly of alley-cropping. The tone is optimistic and details from literature are given. Then the author complains: 'Yet the economic contributions of agroforestry on the farm have not been assessed in any systematic way. And 'the financial benefits of different systems, from the perspective of the farmer need to be known much more'.

The MRTC was of the same opinion when donors asked it, in 1990, to promote alley-cropping. Before it was willing to do so, it wanted to test the technology and solicit the opinions of farmers. So in 1990 a trial was planted with millet/sorghum between hedgerows of *Leucaena leucocephala*. All relevant parameters were measured: cereal yields, firewood yield, labour requirements and soil fertility. Every year the results were discussed with farmers. After four year the conclusion was that it technically feasible, but too risky because in dry years cereal yields were depressed. Another risk was that any delay in pruning the trees during the rainy season would lead to severe yield reductions, even when rains were good. Since in years with good rains the yield under alley-cropping were better, the total cereal yield (in four years) was the same as in normal fields. So the only returns to the extra labour was to come from the firewood from the trees; yet the firewood gained was not enough to pay for the additional labour needed.

In 1994 the data and the opinions of farmers were published. The MSc student reports that he visited the MRTC trial field in 1997 and he has read the publication. Yet, in the thesis he concludes that 'the results of the trial were promising'. And also: Despite of this demonstration plot at the MRTC, peasants were not willing to adopt the system. They still *believe* (*sic*, GH) that it leads to the reduction of crop yield, which cannot be compensated by other benefits[108]. None of the many data that were provided in the publication are mentioned. In this way the study manages to stay 'neutral' towards the technology and that makes it possible to come with some very general recommendation at the end: extension efforts should be tailored to farmers needs and more participatory approaches are needed.

This study confronts us with a real contradiction. While it quotes several publications that call for research to see if innovations fit in the farming system, when this is done in the place and topic of the study, the data are not used. Apparently the student is afraid to upset the policy narrative. Indeed the idea that alley-cropping is 'good' was among the most powerful policy narratives of the 1990's.

[105] particular fetching the necessary water is problematic; see Holtland, 1994
[106] Meertens et al. 2002
[107] Mukome, 1988.
[108] Mukome, 1988. Pag.41.

Returns to public investments in agricultural research

In 2005 the International Food Policy Research Institute (IFPRI), published a paper on public investments in Tanzania[109]. The aim was to analyse how public spending can contribute most effectively to poverty reduction. The returns to four areas of public investments have been estimated: education, health, roads and agricultural research. To estimate the impact of investments on poverty, the correlations between household incomes (measured in a Household Budget Survey, 2000-2001) and a number of variables was calculated. The estimates were made for seven zones in the country.

The paper concludes that public investments in agricultural research in central Tanzania are the most efficient way to reduce poverty in the country (except for investments in education in the Western zone). In the light of what we have seen above, this is remarkable. The foundation of the conclusion is the fact that households in the central zone that are using improved seeds annually earn an additional 54.000 Tsh or 60 USD per capita. This means an increase of income of 30-40%. This does not only *seem* impossible; this can be proven as well. A family has 4.4 member on average; so the extra family income due to the use of improved seeds would be some 237.000 Tsh. This has to be earned on the 6.2 acres that the families own. So per acre an additional 38.000 Tsh has to be earned with improved seeds. With an average grain price of 75 Tsh/kg and 15% costs for marketing, the additional yields due to the seeds must be about 1500 kg/ha.

This is impossible. Long term average yields in the area are in the range of 500 kg/ha. MRTC did some trials to compare local and improved seeds. Better husbandry alone (planting in rows, proper land preparation, timely weeding, higher planting density) increased yields of local varieties to 1.000 kg/ha. With good husbandry, some new (short straw) varieties yielded a further 30% extra (so 1.300 kg/ha). So labour is the key to higher productivity, not the use of improved seeds. Using improved seeds without better husbandry does not make sense. At best the yields would be the same and family income would be less due to the poorer storage qualities and taste of new varieties[110].

Labour productivity plays a double role. The model used by the researchers included all assets of the family, but not 'hired labour'. This made it possible to attribute the additional income to 'seeds' rather then to 'labour'. This explains the big effect of seeds in Central Tanzania, where we have a vicious circle of poverty caused by overpopulation and poor natural resources. A shortage of land makes it impossible to leave land fallow. This leads to low soil fertility and low yields. The low income forces poor families to sell their labour, which means that even if they have their own land, they are not able to work it properly and yields are suppressed[111]. A few better-off farmers employ the poor; particularly farmers who use improved seeds. Since hired labour is not measured, their higher income (compared to the very low income of the poor) is, incorrectly, solely attributed to the seeds.

Again a sobering story. A well respected, high profile research institutes recommends the government of Tanzania to invest more in agricultural research based on data that must be considered flawed. Again the main problem is that labour productivity is not taken into account. The paper also exposes that the scientists have no practical feeling for the situation. Anybody knowing the situation on the ground in Central Tanzania would immediately reject the notion that using improved seeds would bring an additional income of 237.000 Tsh. to a family. But for scientists from outside this is simply what the data and the model tells them. Insiders would also immediately ask the question what kind of research should be done. The seeds that were used by the households probably came from research institutes outside Tanzania; e.g new varieties of millet and sorghum tend to come from ICRISAT in Zimbabwe and maize varieties from Kenya. As we have seen research station in Mwpapwa and Kongwa did not manage to influence any agricultural development despite decades of investments. Most likely papers like this one, that are misreading the local situation so badly, will only feed the cynicism of politicians and practitioners towards researchers, rather then enlightening them.

[109] Fan et al., 2005

[110] See Holtland, 1994b

[111] See our earlier discussion on labour productivity

4 Conclusions

4.1 On destocking

The picture emerging from existing literature is that destocking was a failure. On the technical side it seems that it did not bring sufficient gains in terms of food and income to the people in the area. On the social-political side the failure is attributed to the top-down approach of HADO. All this is based on the experience in KEA; the experience in Mvumi, however, shows that the actual situation is much more complex. There are indications that destocking can be a way of intensifying the farming system, in the tradition of Boserup. It allows more people to survive per square kilometre and it particularly favours poorer households. On the other hand, doubts remain as well: Does malnutrition increase (initially)? What about malaria? Did the total income decrease? Will soil fertility be maintained in the long run?

Combining what is known and what is still open for debate, we conclude that destocking *could* be contemplated under certain circumstances. What these circumstances are needs to be further explored. This could have been done by comparing the Mvumi case with the KEA case. Unfortunately this was never done. What is clear from this study is that in case of future destocking exercises, the focus needs to be much more on transforming the farming system, and not on pure conservation.

If one wants to use destocking as a start for the transformation of the farming system, the following issues have to be taken into account:

- make clear from the very beginning that extensive grazing will not come back;
- assist farmers in finding grazing areas outside the area and offer them the opportunity to exchange some animals for improved animals;
- provide transitional support; e.g. milk for babies; extra attention for malaria prevention, support for income generating activities etc.;
- introduce zero-grazing early on via an action-research approach. The distribution of cows should be fair and a critical mass should be attained as quick as possible. Ensure that zero-grazing comes within reach of normal families;
- the level of involvement of the community in enforcing the rules should be based on extensive consultations with the community. If needed additional resources should be made available to the community. State control should not be ruled out beforehand.

4.2 On the relevance of research

4.2.1 The institutional approach in KEA

The opinions of scientist (and other outside experts) on destocking has completed a full circle. The first step was the DUSER program that emphasised that land degradation was a man made disaster. The Tanzanian response was the evicted of livestock. Then the MALISATA team doubted whether land degradation was indeed man-made and found that it was partly caused by a tectonic uplift. Yet, for all practical purposes the accelerated erosion was man made and they recommended maintaining the destocking. Then the evaluators of HADO judged that destocking was too much a top-down affair and as such, not sustainable, nor replicable. So HADO handed over its responsibilities to the villages. Next British researchers concluded that the villages do not have the capacities to enforce the by-laws. They advocate the use of decision support analysis system that would make all relative merits of different courses of action transparent. So we are back to square one; only twenty years on and dozens of publications later. Unfortunately the huge number of publications contain very little information to elicit the “relative merits of different course of action”. Despite all rethorics, very little is known on the impact of destocking on essential issues like land use, soil fertility, yields, health, (mal-)nutrition, water availability, off-farm income etc.

The changes of opinion among scientist ran parallel to the development of international policy narratives on natural resource management. In the 1970's and '80's most attention was paid to the technical aspects of the overexploitation of natural resources due to human activities. In the 1990's land degradation was seen as a social issue and participatory approaches and indigenous knowledge were seen as the key to improvements. Towards the end of the 20-st century the rhetoric turns to good governance and the theory on NRM focuses on institutional economics. The research agenda was set more by these shifting policy narratives, than by the local reality.

The livestock research programme provides some other insights. Students (Tanzanian and Swedish) are more open-minded and try to make sense of farmers' realities. This drives them into economic calculations. Unfortunately most of these are flawed; especially from Tanzanian students. Still they provide a picture of what is going on. Tanzanian scholars seem to feel an urge to come with practical solutions, yet the proposed solutions are again more determined by policy narratives than by local realities. The internationally peer reviewed paper proved to completely out of touch with reality; it describes the optimal rationing of grasses that nobody grows to cows that nobody has.

So all in all, despite the fact that both research programmes were intimately linked to HADO, they did not come with relevant findings. Consequently they had little, if any influence on the policy decisions taken by HADO[112]. Relations with KIRDEP were also very weak, but this can be attributed to the attitude of the practitioners as well. They deliberately paid more attention to participatory planning processes then to understanding the details of the farming system.

4.2.2 Action research by MRTC

The research at the MRTC into impact of destocking did not lead to a final assessment, but provided insights that made it understandable why farmers were often more positive about destocking than outsiders. The assessment that the poor are better off after destocking was confirmed by the food security survey. A second challenging finding is that with very high population- and livestock densities, soil fertility can be better maintained without animals.

The action research showed that the findings of trials and surveys can be translated into a range of new policies for the programme to introduce zero-grazing: on the target group (selection of women and poor families; spreading the project across villages), on fodder production (no fodder plots) and on stable construction (using only local materials). These adjustments brought zero-grazing in the realm of average farmers and boosted the positive feelings towards this radically innovation. This enabled people to see destocking more as a transition from extensive to intensive livestock keeping, than as a pure conservation effort.

4.2.3 Stand alone studies

While the MALISATA and LPRI programmes try to built on a permanent focus on KEA, the stand alone studies are more thematically oriented. They suffer from a number of shortcomings. First of all, most overlooked the importance of destocking; most simply mention it as a fact of life. As if it is normal to find farmers practicing zero-grazing in an area with 500 mm of rainfall. None attempted to integrate the destocking in their analysis: even not in those cases that this seems highly relevant (e.g. in innovations related to intensifying the farming system). Secondly most data were very sloppy. Either because they tried to extract too exact information from quality oriented methods, or because the actual collection of the data has been very poor. As the authors are not aware of the local situation (also because they hardly use the available literature), they do not notice the flaws in the data and the conclusions. Apparently they do also not check their papers with knowledgeable people. Especially when this is done in high profile policy papers, this can undermine the reputation of science.

[112] The focus is on policy decisions; this des not deny that a particular (PhD) study (Yanda, 1995) lead to a change of opinion from HADO. They decided not destock a part of the villages that was planned to be destocked.

4.3 Factors inhibiting the generation of relevant results

Destocking has not only been a dramatic experience for the inhabitants in KEA and Mvumi, but for development scientists as well. We should have learned much more from this real life experiment. Here we elaborate on the factors that inhibited scientists to contribute relevant results.

Research organisation
Scientists prefer to do independent research. They feel that scientific interests and curiosity should guide the research agenda. A too close link between research and development interventions might endanger the quality of the research. Scientists see their research as one element in the conceptual advancement of their discipline. They want to address issues that are much more fundamental than the actual, local situation that they are studying. They do not aim at contributing to finding local solutions. They assume that a better general understanding in their discipline, will ultimately contribute to solving specific local problems. In theory this seems to make sense but in practice it did not work in Central Tanzania. Research questions (that have to be) formulated at the beginning of the research are based on the scientific discourse and policy narratives and the knowledge generated in this way is not of much use locally. Even worse, we have seen that it are exactly these policy narratives that make it very difficult for outsiders (scientists and practitioners) to see local realities.

Preference for abstract models above local realities
Science is advancing via ever more abstract models. The 'new institutional economics' and the 'livelihood approach' are examples of complex models that try to explain local realities in an abstract way. These models are (more or less by definition) too abstract to be of any practical use, but working on such model gives much more status to scientists, then working on local solutions. Actually research into the viability of innovations is often not recognised as scientific work. A study into the 'decomposition of shrub leaves in alley-cropping', is seen as a scientific endeavour. But a field trial in one particular area to see if alley-cropping fits in the local farming system, is merely seen as an 'adoption trial' and has a much lower status in academia.

Disciplinary orientation
The approach followed by the institutional scientists is reductionistic. Each study focuses on a single aspect of the system but an overarching view is lacking; even in the case of the two large research programmes. This seems to inherent to the scientific approach and methods. Probably the failure to compare developments in Mvumi with KEA can be best explained by the fact that there is no scientific discipline called 'destocking'. So there is no scientific incentive to study 'destocking'. But there are incentives to study soil erosion or animal feeding. Both of these disciplines have a tradition of seven decades in Central Tanzania, and although they failed to contribute any practical solution to the faring community, they are still maintained (mainly via support from development funds).

Lack of attention for economic realities
The scientific discipline that could force a link between science and development needs, (micro-) economy, is hardly applied. And when (Tanzanian) students try to apply them, they do so poorly. Often elementary and fundamental mistakes are made in the calculations, rendering the outcomes useless. Apparently these students did not get the necessary support in the capacity building programmes. Particularly labour productivity receives too little attention; both from practitioners and from scientist; in Tanzania as well as internationally[113]. This problem has a long history. Until the 1980s farm economics was seen as one of the most essential discipline in development research. Economists collected information on land, labour and capital via farm management surveys. However these were increasingly seen as too time consuming and complicated. Rapid Rural Analysis replaced the surveys and later this was transformed into Participatory Rural Analysis. In Dodoma, a Farm Management Survey was done in the early 1980s[114], as part of a planned Integrated Regional Development Programme, that was never implemented (confirming the arguments against such

[113] See also Meertens et al. 1995
[114] AHT, 1984

surveys). I used its data, supplemented with our own measurements, to calculate land- and labour productivity. Unfortunately I did not come across any other publication that used this information[115].

Poor quality data from qualitative methods
In several cases PRAs generated incorrect data. This does not mean PRA-techniques do not have any value. They can be very useful in getting in-depth understanding of some elements in a system that one knows already fairly well; but they are not suitable to come to understand a complex system from scratch. And to use hem as a sole source of information is dangerous. If mistakes generated by qualitative methods are not corrected by more quantitative methods, misunderstandings on the lives of the poor will continue to grow.

Asymmetric relationships
Tanzanian scientists seem much more oriented to trying to solve concrete problems, than their foreign counterparts. But the latter tend to dominate the research agenda; in this sense the evaluation of MALISATA is very much in line with other evaluations of joint research programmes[116]. At individual level African PhD students are equally vulnerable. International scholarship programs can be useful for some specialists, for the majority, such courses may do little to build capacity; indeed they may even reduce it[117]. When they come to western countries for advanced studies they have to struggle to grasps the latest, abstract concepts. They are skilled "to manipulate the fashionable jargon of the day"[118]. And they need to invest so much in proving their supervisors that they mastered these, that no time is left to have an open-minded look at local realities. Even worse, they are tempted to collect additional proof for the latest concepts and policy narratives, as this could advance their career. Like their colleagues in other African countries, Tanzanian scientist depend nearly entirely on foreign funding for their work[119]. And the dependency has deepened over time; e.g. the government budget per agricultural scientists in sub-Saharan Africa decreased with 30% between 1971 and 2001[120]. In terms of PhDs, 90% of the African PhD holders obtained their degree overseas[121]. So the African scientific community depends on the scientific community in the North, both financially and conceptually. It seems that one way of maintaining this dependency is to stress the need for abstract concepts. The role of African PhD students seem to be to support the concepts developed in Europe with case studies. But the very eagerness and pressure to confirm the dominant policy narratives can easily make them insensitive to local realities, turning the policy narratives into self fulfilling prophecies.

Interaction with practitioners
The interaction between scientists and practitioners is problematic. There is hardly any feedback from farmers, practitioners and policy makers on research findings. Even worse: most researchers do not enter into debate with one another. The focus their attention on debates with their (disciplinary) peers, rather than on debates with practitioners and policy makers. This happens, despite enormous efforts of some scientists to bridge the gap between science and practice. For example several MALISATA team-members went at great length to discuss matters with practitioners; including translation publications in Kiswahili. Yet, apparently this is not enough. Partly this is because they did not have the information/knowledge that their partners in the dialogue needed.

So the lack of debate must also be, partly, attributed to policy makers and practitioners who do not seem to be keen on reading scientific papers. And of course some of them stop reading, as they find the quality too low and the findings irrelevant. Next to this, the large number of publications and their specialised nature makes it virtually impossible for practitioners to respond to them. Lastly much of the research findings contradict each other, so it is hard for practitioners to make sense of the total.

[115] The fact that in Dodoma only one person (the regional planning officer) had a copy of the report explains this partly
[116] See o.a. Holtland and Boeren, 2006. (par. 4.3); Baustita et al., 2001 and RAWOO, 2001
[117] McNeil. 2005. p.19
[118] Carton, 2005
[119] Alberts et al., 1999. p. 18
[120] IAC, 2004.
[121] Saint, 1994

So, despite the efforts of some scientists to organise the interaction between themselves and the potential clients of the research only a small fraction of the available scientific insights is effectively used in public debates and in designing development interventions. This is very unfortunate, as it leads to a further dominance of policy narratives over local realities. As a result, development programmes risk promoting inappropriate innovations. A screening at the MRTC of a range of innovations promoted by development projects in Dodoma, revealed that several of them do not make economic sense from a farmers' point of view. This does not only count for contour-bunds, composting and alley-cropping, as we have seen earlier on, but also for ox-ploughing[122] and using green-manure[123]. Both were based on the policy narratives ox-ploughing was seen as "appropriate technology" and the green manure as a form of "sustainable, low external input agriculture".

In 1994 MRTC published all research findings locally to make it easier for practitioners to access the information. This did not work out well. When the present author checked in 1997, in 2002 and during this study whether practitioners had read it, very few had done so. Actually already in 1997 the regional library of SNV in Dodoma did no longer carry a copy. On the other hand, publishing locally meant that few scientists had access to it. And for those who did read it, we have seen that it is easy to quote the parts they liked and ignore the data and insights that did not fit their agenda; as they knew that their readers most probably did not know the publication.

[122] The soil is too hard to plough before the rains, but the rainy season is too short to delay planting after the first rains . Ox ploughing only makes sense in the 7-10 days after the first rain; this period is too short to recover the investments. Still many NGOs and the MoA promote the use of oxen. See Holtland, 1988 and 1994.

[123] Chilanga (199), proved that growing green manure (as relay crop) was not viable. Although this was published in the Newsletter of the Min. of Agriculture, a Worldbank project of the same ministry promoted the technology two years later.

5 The way forward

In-depth knowledge on local realities is of paramount importance for any development intervention. The knowledge created via action research in Mvumi contributed to the transformation of the farming system after the destocking. In the case of KEA however, the institutional scientific community, proved not capable of generating relevant knowledge and did not influence the events on the ground.

Without in-depth knowledge, development interventions will be captured by short-term interests of specific groups. This case study showed that scientists are an interest group as well, with their own (career; scientific) interests. So 'harnessing science' for the benefit of development, also means that 'scientists have to be harnessed'. The study shows as well that it can not be assumed that research aiming at advancing the scientific discourse will automatically yield locally relevant results as well. On the contrary; it is very unlikely that research set up with the intention to advance the scientific discourse, will lead to locally relevant results.

So if development funds are used for research, local stakeholders should commission the research and determine the agenda. Clear objectives should be agreed upon. Scientists have to report regularly on the progress. The stakeholders should review these and be committed to connect any result to farmers, practitioners and policy makers. The aim should be to generate recommendations that can be implemented in the short- to medium term. Special attention needs to be paid to the economic underpinning of conclusions and the practical ramifications of findings and recommendations.

These are not easy pre-conditions for scientists, as there is no guarantee that priorities selected by the stakeholders are of any particular (disciplinary) scientific interests. Since development scientists have only one career path (within research institutes) there is a need to create a new tradition with new career paths and alternative institutional settings where relevant knowledge can be generated. There is a need for NGOs working systematically on rural development via action research. This is particularly relevant for marginal areas, where knowledge is scarce. Such a set-up ensures that knowledge is produced and used locally. Institutional costs are reduced to a bare minimum. Or, in the words of Rip: the double translation is no longer needed.

Our paper showed that there are drawbacks to this approach as well. One is that findings of action research that are published locally are hardly recognised beyond the border of the own organisation. This is one of the reasons that such NGOs need to cooperate with research institutes. The other is that both types of organisations can learn much from each other. The action-researchers need support from disciplinary oriented scientists and the latter need support in formulating research questions that could lead to more relevant results.

At individual level, African PhD students should establish their research agenda with local stakeholders. Funds and assistance need to be made available for an identification phase for local research needs. This could well take up to one year. Only after that, a programme should be designed to ensure that the student gets all necessary knowledge and skills; a programme that preferably should encompass different disciplines and different universities.

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