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• *Arid and semi-arid regions – Traditional water usage – Water supply policy – Northern Namibia*

Steffen Niemann (Würzburg)

Indigenous Water Resources Management and Water Utilisation in Northern Namibia (Former Ovamboland) – Can Tradition Help to Overcome Current Problems?

Endogene Wasserwirtschaft und Wassernutzung im Norden Namibias (ehemaliges Ovamboland) – Können Traditionen zur Lösung aktueller Probleme beitragen?

With 4 Figures, 1 Table and 4 Photos

The development of many regions in arid and semi-arid countries is restricted by water scarcity. Preserving relevant aspects of populations' indigenous culture of managing water as a scarce resource and purposely including and implementing them in modern water saving policies may be a valuable way of preventing social tensions. Such aspects of water resources management are not transferable, they must be identified separately for each single region according to its ecological conditions and people's specific traditions of water utilisation. In northern Namibia, the Ovambo population has developed a solid and sound system of using a variety of different water sources for specific purposes, each of them according to its water quality. However, the technique and the awareness are being destroyed by the policy of satisfying any demand with water brought artificially from Angola.

1. Introduction

The issue of the availability of an amount of water satisfactory both in qualitative as well as in quantitative terms started gaining more and more attention in the media during the last decade and became an important field of interdisciplinary research, especially following the United Nations Conference on Environment and Development of Rio de Janeiro in 1992. The World Bank identified six regions in the world where water scarcity should urgently be addressed in order not to hinder development or even lead to violence (*Swatuk* 1997). Apart from northern Africa and the Middle East, southern Africa is one of the world's regions with the most difficult water situation. The degree to which the risk of 'water wars' has globally been put on the agenda since the beginning of the 1990s (see also *Polkehn* 1992) might be exaggerated. However, water scarcity must be seen as one of the central challenges to be overcome during the next decades (see e.g., among many others, WBGU 1998).

Water scarcity – like any other economic value – can be defined as the proportion of supply and demand. Transferred to the water situation this means the absolute amount of available water on

the one hand and the number of persons to be supplied with this water – thus the population density – on the other hand (see also *Postel* 1993). Generally speaking, areas where per capita water availability drops below 1700 m³/year are experiencing 'water stress' – a situation where disruptive water shortages can occur frequently. If water supplies drop below 1000 m³/a, the population faces the risk of severe problems with food production, sanitation, health, economic development and loss of ecosystems. Based on such considerations, this article focuses on the most densely populated area in the most arid country in sub-Saharan Africa, the former Ovamboland region[1] in northern Namibia (see also *Niemann* 2000 and *Heine* 2001)[2]. Even if the region's average annual precipitation of between 300 and 550 mm is relatively high compared with other parts of the country, its population density gives the region an extraordinary status for 'hydro-social' investigations in the arid or semi-arid African context.

2. Regional and Historical Background

In this ecologically fragile region situated in the triangle between the Kunene river in the west, the Kavango river in the east and the Etosha pan in the south (*Fig. 1*) human settlement and way of life have for centuries been determined by access to water (see also *Williams* 1988, *Siiskonen* 1990 and *Mendelsohn* et al. 2000). For centuries, the Ovambo had relied on local precipitation and the annual flow of the *efundjas* in the *oshanas*, seasonal rivers of the Cuvelai delta inundating huge parts of the territory. Precipitation in this area, however, is not only dominated by irregular annual distribution (rainfall is virtually limited to not

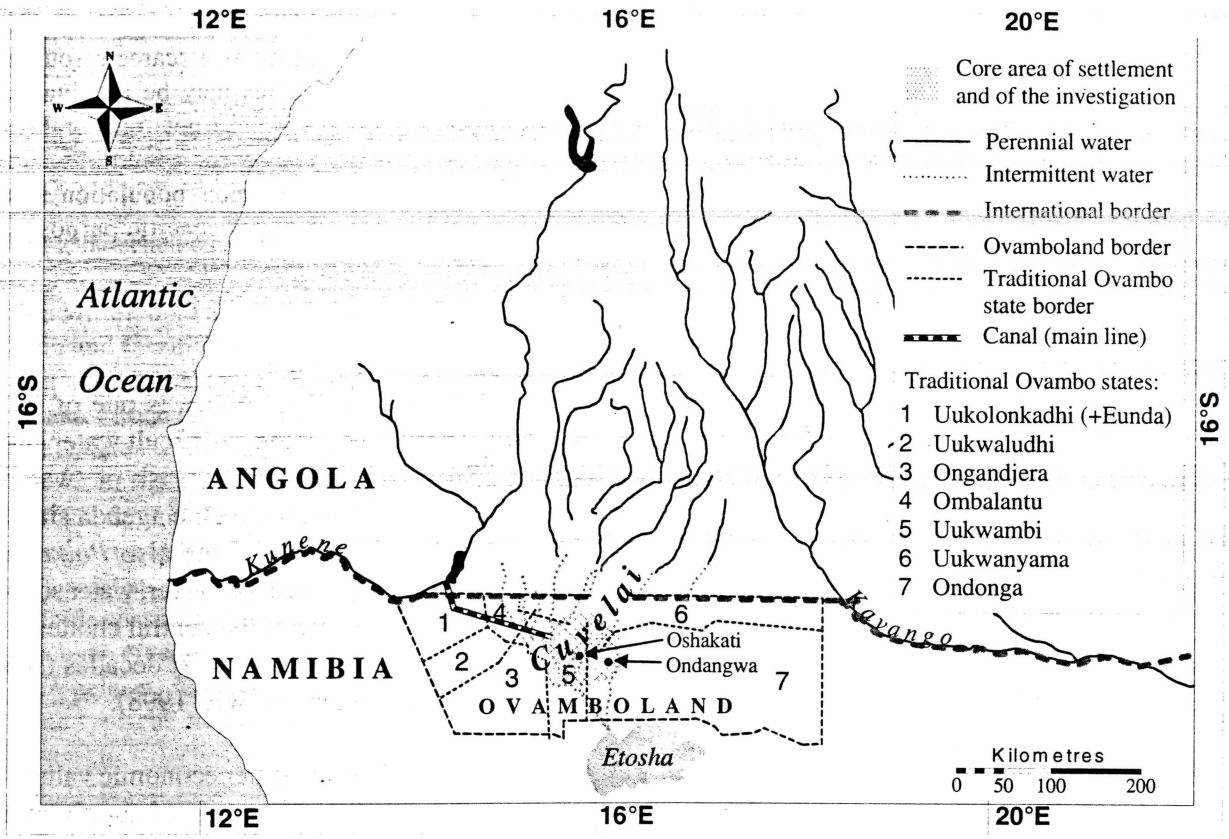

Fig. 1 Southern Angola and northern Namibia: basic hydrological situation / *Südliches Angola und nördliches Namibia: Übersicht über die hydrologische Situation*

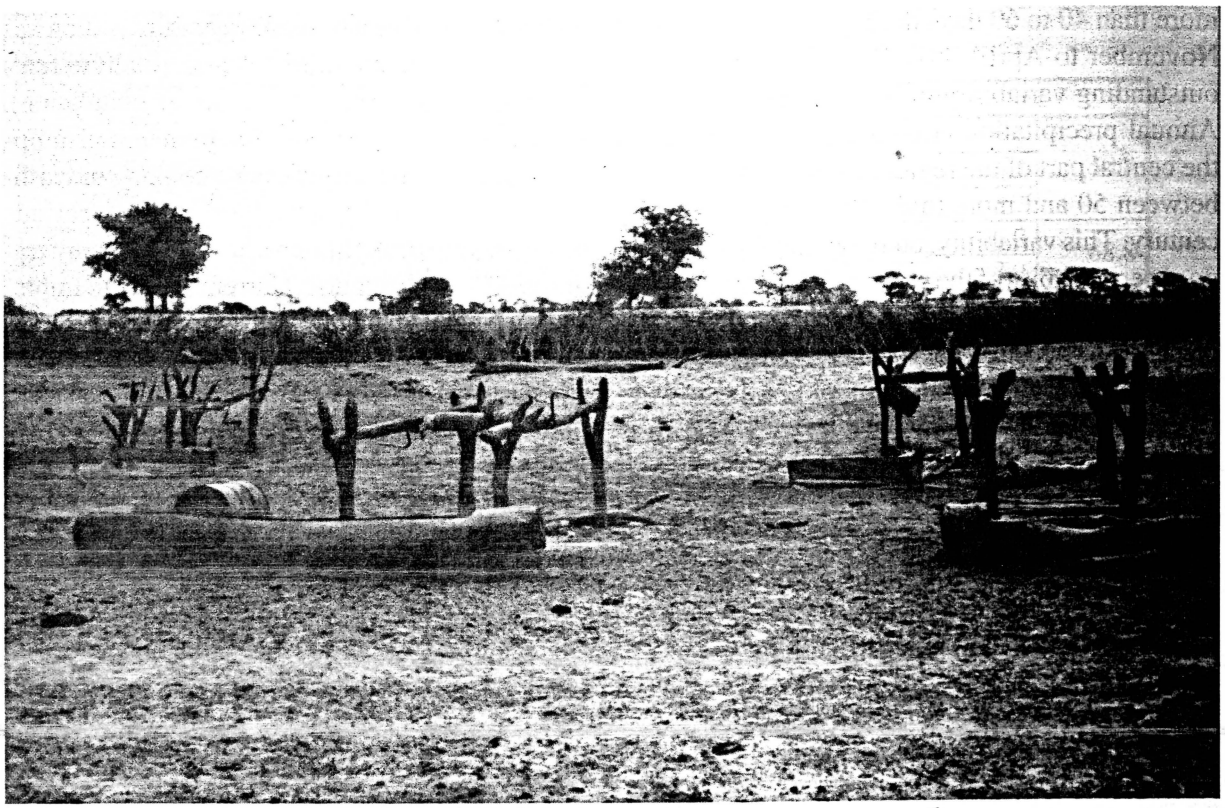

Photo 1 Traditional wells in southern Ondonga / *Traditionelle Brunnen im südlichen Ondonga*

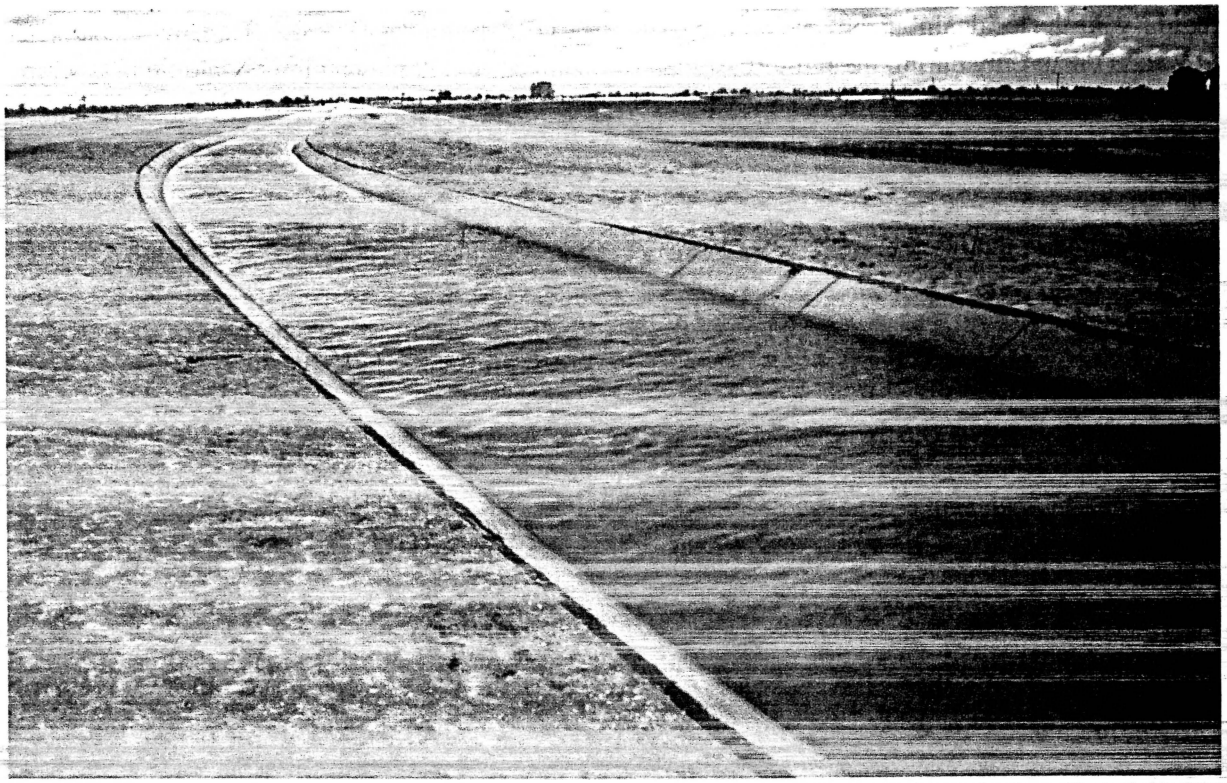

Photo 2 The canal supplies Kunene water for the Ovamboland population / *Der Kanal liefert Wasser aus dem Kunene für die Bevölkerung des Ovambolandes*

more than 40 to 60 days during the months from November to April), it is also characterised by outstanding variability of total rainfall per year. Annual precipitation at Ondangwa, a station in the central part of the region, for instance, varied between 50 and more than 1000 mm in the 20th century. This variability, compounded by the very poor permeability of the upper soil horizons, leads to a constant alternation between flooding and drought – one of the key characteristics of the region – and thus creates many challenges to various aspects of people's everyday life, the major one being the supply of drinking water (see also *Hayes* 1998).

The central parts of the region are covered by a net of intermittent water courses. These *oshanas* or *iishana* (as they are called in the local language) of the Cuvelai delta serve as guidelines for the annual sheet floods from southern Angola, so-called *efundja*, to central Ovamboland (see also Desert Research Foundation of Namibia et al. 1992). This is the only natural surface water in the region. Like the local rainfall, however, the *efundja* waters occur only during the rainy season and seep away or evaporate within a few weeks or months afterwards. They therefore can contribute to the water supply for the population to only a very restricted degree. This also applies to the ground water which is very saline in many parts of the area (up to more than 20,000 mg Total Dissolved Solids per litre). Only in remote areas does ground water contain less than 1000 mg Total Dissolved Solids per litre and is thus suitable for human consumption. Here, the utilisation of brackish ground water aquifers located in greater depths' strata could be remarkably improved by the drilling of boreholes during the previous decades. The census of 1991 found that 8% of the region's population uses water from boreholes. In the most densely populated parts of the former Ovamboland region, however, ground water contains more than 5000 mg Total Dissolved Solids per litre and thus can be used neither for human consumption nor for cattle.

In the Ovambo's traditional way of life, which has been dominated by subsistence agriculture (cattle and goat breeding as well as millet cultivation), water has been used only for human consumption and domestic purposes like cooking or washing, and for cattle. Despite the alternating periods of floods and drought there has not been any traditional use of irrigation. Current efforts to implement irrigation in Ovamboland are hindered by the resulting lack of experience, the unsuitable soils and the risks associated with an increased off-take of water from the Kunene river.

Traditionally, ground water has been tapped by hand-dug wells (see e.g. *Vainio-Mattila* 1996, see also *Photo 1*). In 1991, 60% of the region's population was stated as taking their water from wells. Noting that the census survey was carried out in October, i.e. before the rainy season started, and that during this time of the year many people using wells shift to the utilisation of other sources, one may presume that on an annual average the proportion of people supplied by hand-dug wells was (and maybe is?) even higher than 60%. Thus, traditional water sources do still play an important role in covering the people's day-to-day demand for water.

However, in the first half of the 20th century it became obvious that there was a need for new water sources to satisfy the people's demands (*Mendelsohn* et al. 2000) due to political and infrastructural changes as well as an enormous population increase. Intensified efforts to locally build storage dams was not a sufficient solution to the problem and so, beginning in the 1960s and 1970s, the 'Ovambo Water Scheme', a pipeline and canal system, was built to transport water from the Kunene river in southern Angola to central Ovamboland (see *Stengel* 1965, see also *Photo 2*). This resulted in a change from traditional use of local water resources to the modern pipeline and canal system which was further reinforced by the building of additional infrastructure. Providing sufficient available water for the population in the central part of this region has involved becoming totally dependent on water

Tab. 1 Water sources and numbers of users in former Ovamboland, 1991
Wasserquellen und die Zahl ihrer Nutzer im ehemaligen Ovamboland 1991

Water source		Number of users		%	
Water scheme	Private tap	37,910	183,178	6.4	30.8
	Public tap	96,255		16.2	
	River, canal, lake*	49,013		8.2	
Local resources	Well	357,160	409,922	60.0	68.8
	Borehole	52,762		8.9	
Others or unknown		2,313		0.4	
Total		595,413		100	

Source: Republic of Namibia, National Planning Commission 1993: Tab. H06

* Due to the lack of alternatives within the region, this category is virtually limited to the canal, i.e. registering people who are taking water directly from the canal grid.

brought artificially from the neighbouring country, which means that the development of the most populated region of Namibia is now dependent on Angolan-Namibian contracts of cooperation in the use of the Kunene river (see also *Heyns* 1995, *Meissner* 2000). This dependency on international cooperation emphasises the importance of reducing current or expected problems of water supply through measures which can be taken within the region's water demand and which are adapted to its specific water conditions.

As can be seen from the data given in *Table 1*, in 1991, as a result of the continuous extension of the grid (of so far more than 1000 km), already nearly one out of three inhabitants of the former Ovamboland region used water brought from the Kunene river. These data are derived from the census carried out in October 1991. In Namibia, a census is planned for every ten years. It would definitely be very interesting to compare these data with those of the census of 2001, the data of which were unfortunately not yet available at the time of submission of this article. The author's own observation as well as information gained from numerous interviews reveal that many people use different types of water sources in different seasons. This is why it is important to note that the census took place in October, at the end of the dry season. The differentiation of water sources in different parts of the year does, incidentally, lead to important consequences: In an investigation carried out by *Terry* et al. (1995: 60) various interview partners stated that they spend more money for medicine during the rainy season since they more often use open water sources with turbid water.

Among others, one special focus of the author's project was upon population growth in the investigated area since the acquisition of national independence in 1990. Analysing the annual statistics of the Evangelical Lutheran Churches of Namibia (ELCIN) and projecting the data of the largest church in northern Namibia (see also *Siiskonen* 1998) on the total population of the region reveals that the population in the investigated area has increased at an average annual rate of 3.8% during the years 1990-96. After nearly one decade with official estimations assuming a rate of increase of northern Namibia's population of only a little more than 3%, this information offers a demographic short-term basis for future planning in northern Namibia.

3. Changes in Water Supply and Demand: The Water Demand Spiral

Connecting additional parts of the region to the pipeline grid results in a decrease in the usage of local water resources (wells, storage dams or bore-

holes). The resulting increased dependency on Kunene water is further enforced by two processes taking place simultaneously: population growth and migration of people from rural areas to peri-urban and urban centres.

In addition, this measure initiates a vicious circle which creates enormous problems for water supply, as can be observed in a similar way in many parts of the world and which is illustrated in the 'water demand spiral' given in *Figure 2*.

A growth in population leads to an increase in water demand, and the creation of additional water infrastructure becomes necessary. The population concentrates increasingly along the new infrastructure (canal, pipes) and gradually turns away from 'handed-down behaviour' in water utilisation. Traditionally, in most societies the awareness of the value of water was well established – simply because fetching water was (and in many places still is) hard and time-consuming work. However, the process described here leads to an increase in per capita consumption and water needs, in a cycle of processes continually reinforcing one another.

Apart from ideas concerning population regulation, it seems that there are hardly any possibilities to break this circle. One way to do so – and maybe the only way – might be to influence or prevent the turning away from traditional water-saving behaviour patterns.

Access to the modern and easy-to-use water net results in a remarkable change in utilisation habits (see also *Photo 3*). This can be seen from the remark of one woman interviewed during field studies. Asked in which way the desired connection of her household to the pipeline grid would influence their use of water, at that time still a scarce resource, she answered: 'We could have a garden, we could do whatever we want with the water. We would definitely use more water than before'.

If measures for the preservation of traditional patterns of water resource management suc-

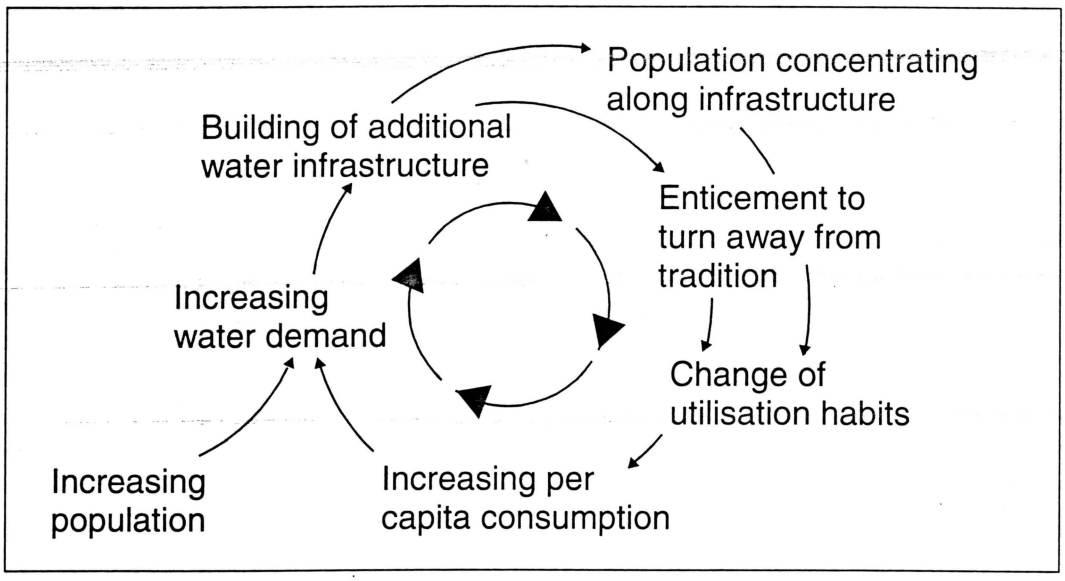

Fig. 2 The water demand spiral: Cumulative causation of population increase, tradition, infrastructure and water consumption in northern Namibia (former Ovamboland) / *Die Wassernachfrage-Spirale: Kumulative Verursachung durch Bevölkerungszunahme, Tradition, Infrastruktur und Wasserverbrauch in Nord-Namibia (ehemaliges Ovamboland)*

Photo 3 Children drawing water from a public tap (Kunene water pipeline grid) / *Kinder schöpfen Wasser an einer öffentlichen Entnahmestelle des Kunene-Wasser-Leitungsnetzes*

ceeded, the change of utilisation habits could be reduced. This decrease would be passed on to the per capita consumption, transmitted to the water demand and thus lead to some relaxation in the supply situation (*Fig. 3*).

Can tradition help to overcome current problems? The potential of the use of traditions of regarding water as a scarce resource seems crucial for the sake of sustainability in water resources management in the future. The fundamental prerequisite for such an approach is the existence of possibilities of combining traditional and modern forms of water supply and water utilisation in the specific region's situation. The re-cognition of difficulties and possibilities of water supply in the past and present by people of different generations and different status or function in society was therefore the focus of the project's empirical investigation.

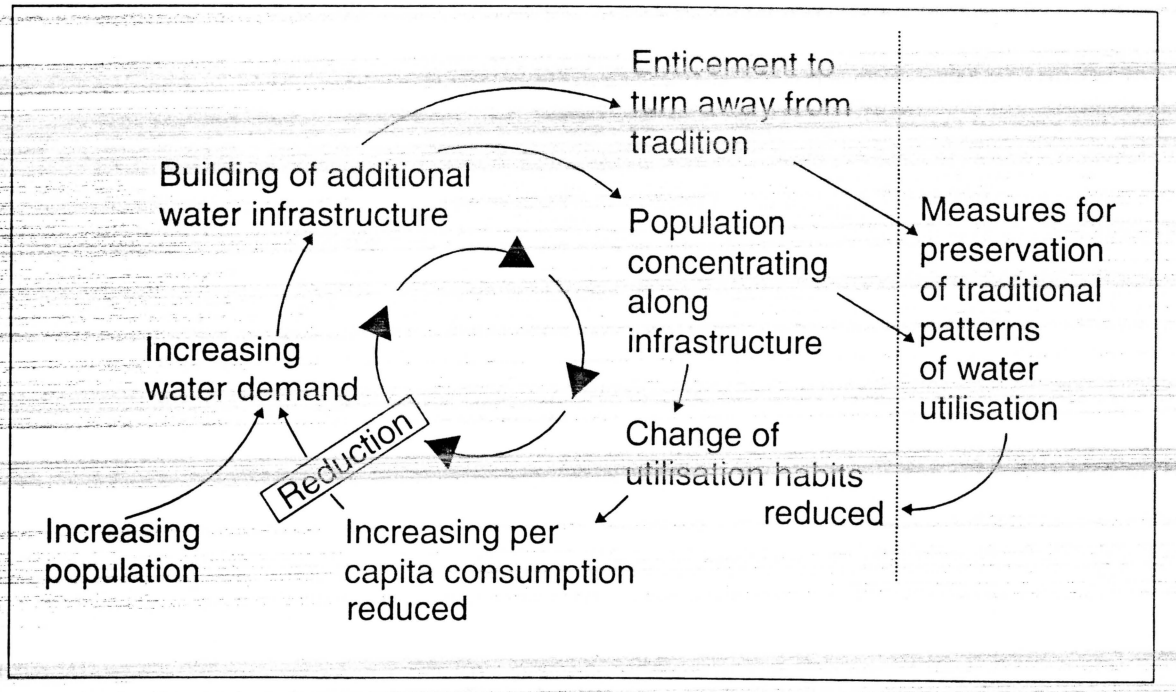

Fig. 3 The water demand spiral and the effect of measures for preservation of traditional patterns of water utilisation in northern Namibia (former Ovamboland) / *Die Wassernachfrage-Spirale und die Wirkung von Maßnahmen zur Bewahrung traditioneller Muster der Wassernutzung in Nord-Namibia (ehemaliges Ovamboland)*

4. Remnants of Traditional Water Usage: Empirical Analysis

The investigation's key aim was to analyse whe-ther traditional water-saving elements still exist within the water utilisation of the population and whether they might be instrumental in controlling and reducing the risks to the current water supply situation in northern Namibia. For this, a multistage approach was chosen: A profound analysis concerning 'What types of water-saving elements within the water utilisation of the region's inhabitants have there been in the past?' was the basis for the second and the third question: 'Which of the historical elements (identified in step no. 1) currently still exist?' and 'Which of the still existing elements (identified in step no. 2) might be suitable for controlling and reducing water consumption and dependency on external factors (Kunene water)?'

4.1 Analysis of written sources: The region's specific history limits traditions' applicability

The investigation concerning 'What types of water usage patterns have there been?' was made by analysing written sources from various archives like missionary diaries, historical government reports and travellers' reports and photos.

Compared with, for instance, the highly elaborated water laws and traditional technologies for the transfer and storage of water which are well-known from the oases in northern Africa or in the Middle East, the findings concerning remnants of a traditional 'water culture' in northern Namibia are poor. Water saving traditions are poorly developed – or one should rather say: poorly preserved. The ecological situation of the inhabitants' activity space strongly suggests that there

must have been a water preservation tradition, but a very profound Christian proselytisation, successive colonisation by three different foreign powers and the civil war lasting from 1966 till 1989 seem to have destroyed much of it.

The hypothesis concerning the conservation of selected parts of traditional water usage patterns being limited by the region's specific history was also backed up by the next step, the main empirical part of the project: the interviews conducted with different groups of people in different contexts.

4.2 Interviews with different groups of people

The recognition of difficulties and possibilities of the water supply in past and present by people of different generations and different status or function in society was the focus of the second part of the empirical investigation. Next to the analysis of written sources, it used participant observation in people's everyday life and water utilisation in selected areas as well as varying forms of in-depth interviews with a multitude of persons as the main research tools. These methods of qualitative research were used in an open research approach. The described dualism in the selection of applied methods insures that the issue of interest is investigated both from an external perspective (interpretation of written sources, participant observation) as well as from an internal perspective (open interviews with people in the investigated area).

Different groups of people were interviewed: Old people and traditional authorities, mainly in the rural areas, were able to serve as a link between different eras in the people's development and between past and present practices of water utilisation. Based on this knowledge, interviews with school classes were conducted in order to investigate to what degree young people are still aware of traditional Ovambo culture on the one hand and of the pros and cons of the modern system on the other hand.

To understand the selection of the investigation area as well as of the interviewed groups of people two clarifications are necessary:

1. Historically, the region known as Ovamboland was not a homogenously settled territory but was divided into different 'states', of which only parts were situated on the territory belonging to Namibia today. Up to the present time, local people have perceived themselves not as being 'Ovambo' but 'Ndonga', 'Kwanyama' or members of any of the other ethnic groups. Partly due to slightly different ecological situations in the subregions, differences in the respective culture and water usage patterns have evolved during the last centuries. This fragmented situation had to be taken into account when the investigation area was selected and still has to be considered when the validity of the results is reviewed.

2. Common sense suggests that the change of traditional habits concerning the utilisation of natural resources partly corresponds with the difference between living in a rural or in an urban context. In many cases, one may assume that urbanisation goes along with the loss of traditional customs. In the case of water supply and utilisation in former Ovamboland this assumption is supported by the fact that the process of extending the pipeline grid is taking place from the towns towards the surrounding areas, thus in an urban-rural direction (see also *Photo 4*). For the last decades, urbanisation has been described as one of the major demographic processes in northern Namibia (see also *Hangula* 1993, *Graefe* 1997, *Graefe* and *Peyroux* 2001). Ondangwa (in Ondonga) and Oshakati (in Uukwambi) are the largest towns in Ovamboland, so these (and their surrounding areas) have been selected as investigation areas for the project. The most numerously populated of the

Photo 4 Continuous extensions of the pipeline grid connect rural areas / *Beständige Erweiterungen des Leitungsnetzes erschließen den ländlichen Raum*

Ovambo states, Uukwanyama, has not been involved much in the process of urbanisation in the past. It is, apart from that, in a special situation because it was divided by the Namibian-Angolan border which has deeply changed people's possibilities of reacting to hydrological incidents (floods, droughts).

In the beginning, the project aimed at comprising a link between the process of losing tradition on the one hand and the spatial rural-urban transition on the other hand by selecting schools at different distances from towns. This, however, was only partly successful. The 'catchment area' from where young people attend a specific school is defined by various other considerations than spatial proximity alone – pupils interviewed in the school class do not necessarily come from the surrounding area and their answers concerning water usage patterns at their home places do not necessarily reflect a specific stage in the spatial rural-urban transition. However, interviewing people of different generation, different social status and 'function' revealed that only small remnants of the traditional awareness about water utilisation still exist.

Apart from the ethnographic interviews with the groups mentioned above, expert interviews were

conducted with people representing different protagonists in the modern water supply system, partly in order to verify aspects of the results, partly in order to confront official policy with these.

Since achieving national independence, Namibia has been implementing a new water policy based on the idea of a water price to be paid by the consumers. After decades of 'free' water this innovation was (and in many parts still is) a very delicate one and influenced the research project's day-to-day fieldwork in many ways. In order to back their rejection towards a water price people often claimed that the idea of any kind of compensation for water was totally unknown and unacceptable in the Ovambo culture's context. However, there were also contradicting results, a final and general statement for all the Ovambo states in each and every situation seems impossible. In any case, however, the answer to this question very much depends on the purpose the water is required for – which leads to the project's major finding.

4.3 Water source mixing based on water quality awareness: Modern water policy turns it down

Even if, generally speaking, the results concerning the applicability of utilisation habits for water-saving measures in the former Ovamboland region are rather poor, there is at least one major asset which could (and should) be used in order to achieve a de-escalation of the water scarcity in northern Namibia: Faced with the respective deficiencies of the various traditional water sources (irregular precipitation, only temporarily existing surface-water, saline ground water), traditional Ovambo culture had produced a sound and solid awareness of using water from different sources with differing quality for different purposes. The water with the best quality was kept for brewing *oshikundu* and *omalovu*, the traditional beer, or as drinking water for guests. At the end of the hierarchy there is the water for the cattle, even if there are, as mentioned above, qualitative limits for that purpose as well.

The modern policy of connecting the former Ovamboland region to Kunene water and satisfying any demand in a flat rate manner with water from one single source not only relinquishes making use of this cultural knowledge – it actually destroys it. This policy seems to be even more of a paradox as – following the connection of regions to the pipeline scheme – awareness campaigns for the saving of water are implemented in order to regulate the population's water consumption. These measures, however, are in many cases not adapted to the specific characteristics of the particular region. Campaigns with mottoes like 'Water is life – use it wisely!' are designed in a flat rate manner for virtually any region of the world (see *Fig. 4*; the fact that this shows a poster from UNICEF must in no way be understood as an extraordinary weakness of this particular organisation's activities). These expensive campaigns would be much more beneficial and efficient if they promoted the maintenance and use of traditional water sources.

Regulation of the water demand from the pipeline scheme must be seen as an important issue where measures should be taken in order to reduce the risks in the current water situation. On the contrary, however, instead of using any potential opportunity to achieve this, water consumption is actually being raised in two ways: On the one hand, more and more areas are being connected to the pipeline scheme (see also *Photo 3*), on the other hand local water resources in these areas are abandoned, and even water for lower-quality use is being taken from the pipeline system. On health grounds it must be a positive step when areas with insufficient local water resources become connected to the pipeline grid. In order to avoid any misunderstanding, it should be emphasised that the investigation does not suggest halting the abstraction of water from the Kunene river for the Ovamboland population. As long as

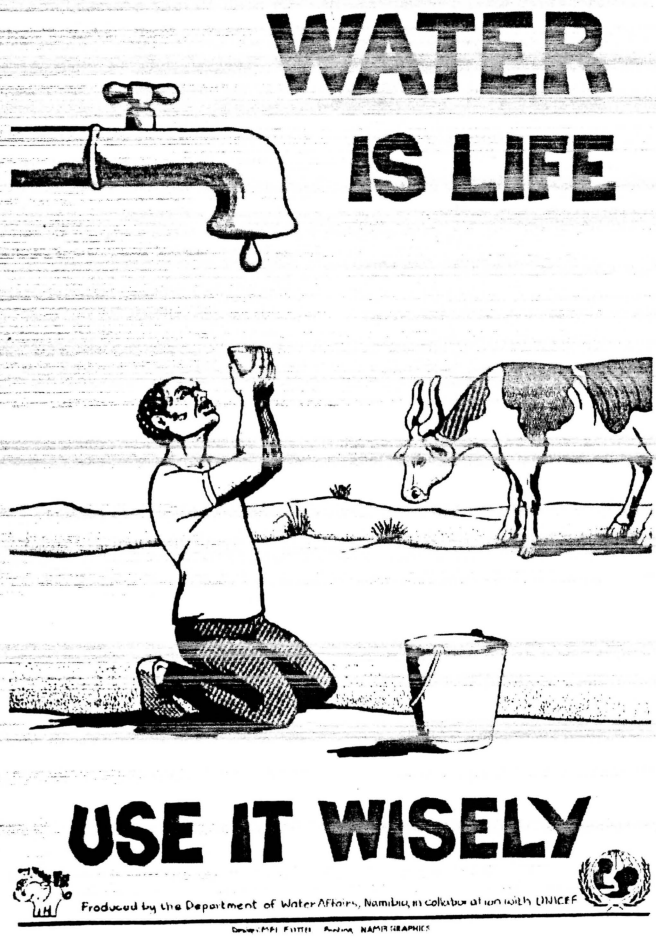

Fig. 4 Awareness campaigns designed in a flat rate manner / *Pauschalisierende Kampagnen zur Bildung des Wassernutzungsbewusstseins*

it is based on safe inter-governmental regulations, this type of water supply is definitely a very sensible one. However, in order to reduce the consumption of pipeline water and the dependency on Angolan politics, it should be accompanied by specific measures supporting the maintenance of traditional local water resources, as the consequences of no longer using local resources result in an unnecessary aggravation of the situation.

On the other hand, the use of any suitable water resource of a variety of water sources, even in those regions where modern installations seem to secure future water supply, could help to reduce water consumption (of pipeline water). The described awareness of the particular water's quality and its suitability for certain purposes as well as the resulting differentiation in usage could serve as a valuable contribution to a de-escalation of the situation: Kunene (grid) water could be reserved for purposes with a high demand on quality while local water resources could be used for such purposes for which their quality would be sufficient. The distilled forms of traditional water utilisation offer the opportunity to tread new paths in water supply policies by making use of 'handed-down behaviours'. Combined with sound international cooperation (avoiding external problems) this can be an important contribution towards defusing the region's water crisis internally.

However, in northern Namibia as in many other regions in the world, an opportunity to integrate

this traditional awareness into modern water supply is unlikely to continue for longer than a few more years, if at all. Complaints of many (mainly older) inhabitants in various interviews and information obtained from interviews with school classes reveal that only small remnants of the traditional awareness about water utilisation still exist.

5. Conclusions

The investigation proposed that it is imperative to pursue the idea of maintaining specific traditions of water utilisation. Using traditional knowledge and methods of water resources management in order to purposely include and implement them in modern water policy can make an important contribution to the prevention of conflicts. This hypothesis must not be misunderstood as some romantically transfigured idealisation of virtually any traditional element of water utilisation. Even if some 'colonial failure to appreciate indigenous knowledge in the field of water resource development' (*Adams* 1992: 106) seems to be evident, small-scale or handed-down solutions are definitely not to be seen as being more peaceful, more egalitarian or more based on solidarity per se than large-scale or modern solutions (see also *Petrella* 2000: 30). It would definitely be wrong to generally presume traditional ways of water utilisation to be more economical (in the sense of water saving) than modern forms. However, in cases where this handed-down behaviour may help to reduce water consumption, the situation simply makes it obligatory to pursue this idea. In the particular region's specific context, 'reducing water consumption' has a double meaning: First, of course, it is the absolute amount of water people use. This is definitely increasing in a needless manner caused by the installation of taps (which quite often after the drawing of water are simply left open because tap water seems to be there in abundance). Second, it is specifically the water brought from the Kunene river. Its demand is rising partly because this water replaces local water resources which from this time on are not used any more.

Within the search for African tradition and its suitability for modern water policy the investigation concentrated on the most densely populated area in the most arid country in sub-Saharan Africa. However, the research project should not be understood as a purely empirical analysis of one specific region's situation. Major key results can be transferred to other regions that face similar risks of an actual or potential water scarcity. This mainly applies to the requirement to include local traditional and indigenous features of water supply and water utilisation into modern water policy. Northern Namibia is definitely not the only part of the world which fails to pursue the idea of maintaining specific traditions of water utilisation, using traditional methods and knowledge of water resources management in modern water policy. Here it is the combination of different types of water sources, in other water-scarce regions it could be other aspects of local and indigenous knowledge that might be worth maintaining. Bearing in mind that, in a global perspective, water consumption per capita has doubled during the last 60 years and that in 2025 two thirds of mankind are expected to face problems of water scarcity, this approach seems to be relevant for more than one single region.

Notes

[1]In order to avoid any misunderstandings, it should be made explicit at the beginning of this article, that whenever the term 'region' is used the whole area of former Ovamboland is meant. Even if, since the acquisition of national independence, 'Ovamboland' is no longer a political-territorial unit, its water supply infrastructure is very much based on the conception of it being such a unit. Thus, talking about Ovamboland in this context is not a political statement but compulsory in the field of water resources management in that location.

[2]The article presents aspects of the author's Ph.D. project carried out between 1996 and 1999. This project of applied geography was part of the interdisciplinary research programme 'Geo-scientific research in Africa' at the University of Würzburg, Germany, and was funded by the German Research Council (*Deutsche Forschungsgemeinschaft*) from October 1996 until September 1999. It was partly based on the Masters thesis (at the University of Hamburg) in which basic characteristics of the water supply situation in the region as well as the role of German development cooperation were highlighted. Before the background of human ecology and political ecology, the Ph.D. project focused on possibilities for using indigenous structures and purposely combining specific aspects of the region's and the culture's characteristics with modern water supply structure.

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Summary: Indigenous Water Resources Management and water Utilisation in Northern Namibia (Former Ovamboland) – Can Tradition Help to Overcome Current Problems?

The applied geography project presented in the article deals with the problem of water scarcity and with potential methods of overcoming this situation. Looking for new ways to de-escalate problems of water scarcity by using potentials of combining traditional and modern forms of water supply and water utilisation, the paper focuses on former Ovamboland as the most densely populated area in the most arid country in sub-Saharan Africa. This region is characterised by a constant alternation between flooding and drought, and its local population has traditionally relied on local water resources to satisfy everyday life's water demand. The construction of a canal and pipeline grid transporting water from the Kunene river means a tremendous change from traditional (*oshana*) water use to modern forms of utilisation. In connection with the continuing population increase this process is leading to a steadily rising water demand and – specifically in this ecologically fragile investigation area – to a growing dependence on water brought artificially from Angola. Based on such considerations, it might be worthwhile to partly maintain specific traditions of water utilisation regarding water as a scarce resource in order to purposely include and implement them in modern water saving policies and thus to regulate water consumption. Aiming at the identification of existing and applicable remnants of a water-saving tradition, interviews have been conducted with different groups in society, particularly old people on the one hand and school classes on the other hand. As far as certain techniques in the Ovambo culture's patterns of water utilisation have developed, most of them do not seem to be very useful any more due to technical inventions, lack of applicability in a more and more urbanised society, or lack of awareness within the younger generation. However, more than the 'hardware', i.e. the technique of water supply and storage, it is the 'software', i.e. the underlying system concerning different peoples' and purposes' access to water sources and, aboveall, concerning the social value of water, that makes the investigated system remarkable. Traditional Ovambo culture has produced a sound and solid awareness of using water from different sources with differing quality for different purposes. This highly sophisticated water source mixing may of course not be applicable to other water-scarce regions and other water-stressed cultures. Each of those needs its own analysis concerning potential solutions on the basis of integrating applicable remnants of a water-saving tradition in modern water resources management.

Zusammenfassung: Endogene Wasserwirtschaft und Wassernutzung im Norden Namibias (ehemaliges Ovamboland) – Können Traditionen zur Lösung aktueller Probleme beitragen?

Das in diesem Aufsatz vorgestellte Forschungsprojekt der Angewandten Geographie gilt dem Problem der Wasserknappheit. Auf der Suche nach neuen Wegen, die sich vielerorts verschärfende Versorgungslage mit Trinkwasser zu entspannen, untersucht die Arbeit die Situation im ehemaligen Ovamboland im Norden Namibias, der dichtestbesiedelten

Region im trockensten Staat des subsaharischen Afrika. In dieser von einem steten Wechsel zwischen Überflutung und Dürre geprägten Region war die Bevölkerung über Jahrhunderte hinweg zur Deckung ihres täglichen Wasserbedarfes auf lokale Wasservorkommen angewiesen. Die Errichtung eines Kanal- und Pipelinenetzes vom Grenzfluss Kunene her hat einen grundlegenden Wandel hin zu modernen Formen und Gewohnheiten der Wassernutzung induziert. Diese Veränderung führt in Kombination mit einem anhaltenden Bevölkerungswachstum zu einem fortdauernden Anstieg des Wasserbedarfs und im konkreten Fall der ökologisch labilen Untersuchungsregion zu einer wachsenden Abhängigkeit von Wasser, welches künstlich aus Angola herbeigebracht wird. Vor diesem Hintergrund erscheint es lohnend, eventuell vorhandene Reste überlieferter wassersparender Nutzungsformen zu erhalten und in die moderne Wasserversorgung zu integrieren, um so den Wasserverbrauch zu regulieren. Um noch bestehende und zugleich anwendbare ‚Überbleibsel' wassersparender Kulturbestandteile zu identifizieren, wurden Interviews mit unterschiedlichen Gruppen der Gesellschaft im ehemaligen Ovamboland geführt, sowohl mit älteren Bewohnern als auch mit Schulklassen. Die spezifischen Techniken in der Wassernutzung, die sich bei den Ovambo in der Vergangenheit herausbildeten, erscheinen heute aufgrund technischer Neuerungen, einer zunehmend urbanisierten Gesellschaft oder fehlender Kenntnisse in der jüngeren Generation zumeist nicht mehr von Nutzen. Mehr als die Techniken der Wassernutzung mag jedoch das zugrundeliegende Bewusstsein um die knappe Ressource ‚Wasser' bedeutsam sein: Die Kultur der Ovambo hat im Laufe ihrer Geschichte eine sehr genaue Vorstellung dafür entwickelt, Wassern aus unterschiedlichen Bezugsquellen und mit unterschiedlichen Qualitäten jeweils bestimmte Verwendungszwecke zuzuweisen. Dieses Ergebnis einer ausgeklügelten Wassertrennung kann freilich nicht auf andere von Wasserknappheit geprägte Regionen und Kulturen übertragen werden. Jeder Raum erfordert eine eigene Untersuchung hinsichtlich eventuell bestehender, in jedem Fall besonderer Möglichkeiten, zu Lösungsbeiträgen in der Wasserkrise zu gelangen – auf der Grundlage anwendbarer Bestandteile einer Tradition des Wassersparens und deren Integration in die moderne Wasserwirtschaft.

Résumé: Economie et usage de l'eau dans le Nord de la Namibie (ancien Ovamboland) – Les traditions peuvent-elles contribuer à la résolution des problèmes actuels?

Le projet de recherche en géographie appliquée présenté dans cet article est consacré au problème de pénurie de l'eau. Cet article a pour objectif d'explorer de nouvelles voies visant à désamorcer les tensions autour de l'approvisionnement en eau potable, devenu critique dans de nombreux endroits. Il analyse la situation de la Namibie, l'état d'Afrique subsaharienne le plus dominé par la sécheresse, dans l'ancien Ovamboland du Nord du pays en particulier. La population locale a été pendant plusieurs siècles dépendante des ressources hydriques locales pour couvrir ses besoins quotidiens en eau dans une région caractérisée par la constante alternance entre sécheresse et inondation. La construction d'un réseau de canaux et de pipelines à partir du fleuve frontalier du Kunene a entraîné un changement fondamental vers des formes et des habitudes d'utilisation moderne de l'eau. Ce changement combiné avec une croissance démographique régulière entraîne une augmentation constante des besoins en eau. Dans le cas concret de notre zone d'étude, écologiquement labile, cela se traduit par une dépendance accrue envers l'eau, laquelle est acheminée d'Angola. Dans ce cadre, il semble alors judicieux de conserver des reliquats éventuels des formes d'usages économiques de l'eau héritées et de les intégrer dans l'approvisionnement moderne afin de réguler la consommation en eau. Des interviews avec des groupes sociaux différents de l'ancien Ovamboland, dont la plupart avec des habitants âgés et des classes scolaires, ont été menées afin d'identifier des «reliquats» d'éléments culturels d'économie d'eau encore existants et applicables. Pour le moins que des techniques spécifiques d'usage de l'eau ont pu être développées chez les Ovambo dans le passé, celles-ci ne semblent plus être utiles en raison des innovations techniques, d'une société urbanisée de manière accrue ou d'une jeune génération sans connaissances. Mais au-delà des techniques d'usage de l'eau, c'est plutôt la conscience de la rareté de la ressource sur laquelle sont fondées ces techniques qui est importante: la culture des Ovambo a développé au cours de son histoire une représentation très