

## **Sustainable Agricultural Livelihood Restoration, Rehabilitation and Resilience in Kenya Training Manual**

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### **2.4.12 SUB-MODULE 12: WATER FOR LIVESTOCK**

#### **Introduction**

The provision of water for animals in an emergency focuses on the survival of livestock assets through and beyond any disaster. In the absence of sufficient water supplies, animals (with the exception of camels) cannot survive for more than a few days. Therefore, in emergency situations where water sources have been seriously compromised, the provision of alternatives is of the highest priority. Even where water is currently available, relief programmes need to assess, and if necessary, implement appropriate responses to potential and future threats to water sources to ensure that other relief efforts are not undermined by water shortages. Whilst water for livestock must meet some basic quality requirements, the quality standard is not as high as that for human consumption, and therefore livestock can make use of water sources otherwise unfit for humans.

The practical implications of providing water to livestock should be considered in parallel with the need for animal feed and veterinary care. Proper cost-benefit analysis will be critical in deciding whether various interventions are sensible and effective in the long-term.

In certain situations such as chronic disasters drawn out over time, emergency interventions may disrupt or go against the promotion of natural coping mechanisms or development planning. Dependency on emergency handouts can also be counterproductive. An understanding of drought cycles in Kenya and ‘drought cycle management’ is useful when investing time and money into emergency interventions. All interventions should therefore aim to complement longterm development goals in the area.

#### **Options for water provision**

Water may be available from a range of sources and deliverable by a number of means. This can at times complicate, or ease the selection of appropriate interventions capable of matching supply with demand. As a rule, the most cost-effective, sustainable and secure options need to be selected. However, the need to distribute water effectively is often so acute that expensive and unsustainable methods such as water trucking may need to be considered in the short term at least.

In an emergency situation, access to water may be provided for livestock owners in one of three ways:

- Improving the management and capacity of existing water points to provide broader access to affected populations.
- Rehabilitation of existing but degraded water points.
- Establishment of new water points.
- Typical water sources in Kenya may include:
  - ground water sources (e.g. hand dug wells, boreholes and spring protection schemes)
  - surface water harvesting systems (e.g. direct extraction from rivers, lakes and ponds, check dams and subsurface dams)
  - rainwater collection (e.g. roof collection, ‘birkas’ and ‘haffir dams’)

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The principles underlying the establishment of differing water supplies and the issues that must be addressed in managing them effectively are broadly the same.

### **Distribution**

After the identification and selection of potential water sources has been made the focus of attention switches to the various methods of distribution. Distribution may be achieved in a number of ways:

- by hand (e.g. using buckets, local pots, jerry cans etc.)
- by animal traction (e.g. donkey carts/saddle bags, use of camels)
- gravity (e.g. open channels, pipelines, hydraulic ram pumps)
- Pumping (with associated pipeline networks)

### **Trucking**

Providing appropriate distribution points associated with various water sources will invariably offer the most viable, longer-term solution to the problem of water shortages for livestock as compared to other key options. A sustainable management plan for the operation and use is imperative and should be considered at the initial stages of an emergency.

Water trucking, as one form of distribution, deserves a special mention here since this intervention should generally be regarded as an option of last resort to be considered in the first stages of an emergency only. It is expensive, resource inefficient and labour intensive. However, due to the critical nature of the impact of dehydration on livestock, it may be the only option that can be implemented rapidly in order to keep animals alive in the short-term. As a rule, therefore, trucking should be regarded as a temporary intervention that will be replaced, as soon as possible, by other means of distribution or eventual relocation of livestock.

### **Complementary interventions**

The provision of water may be complementary to other livestock-based emergency responses, in particular supplementary feeding and destocking, whereby some animals are taken out of the production system and efforts such as the provision of water and feed are made to ensure the survival of the remaining stock. Coordination between initiatives and between agencies is therefore paramount to avoid one activity undermining another.

### **Assessments of water sources**

The proper assessment of water sources provides for the rapid identification, assessment and categorization of available human and physical resources, whether in the field or not, to maximise the benefits for existing and temporary populations and livestock within the disaster-affected area. In addition to technical issues, the assessment needs to consider various socio-economic and targeting issues.

**Vulnerability of specific groups within communities** - ensuring water reaches the most vulnerable livestock owners during an emergency presents a number of challenges. For example, wealthier owners may be able to secure private means to provide water for their animals, which are not open to poorer households. Interventions should therefore take into account the constraints facing vulnerable groups within the



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community to ensure that access is as equitable as possible. Gender roles in the provision of water for livestock should be taken into account, particularly for poorer women and girls who may be at risk of, for example, violent assault or exploitation if they have to travel some distance to bring water for stock.

**Indigenous water management** - disaster-affected communities invariably draw on their own capacities to respond to emergencies, for example in their indigenous knowledge of natural resources; in particular the location, type and quality of water sources and the relationship between those sources and their management. Local water management systems and indigenous institutions may also play a significant role in the management of water points and will remain pivotal in the avoidance of conflict. It follows that existing and indigenous local water point management systems must be taken into account in the provision or establishment of water sources during an emergency, in order to help provide equitable access, avoid conflict and establish sustainable management for the future.

**Security and protection issues** - the security and protection of water users should be taken into account: for example, people, and in particular women, watering their animals at communal water points may be vulnerable to livestock rustling or robbery. Waterpoint management must be addressed prior to rehabilitation or establishment in order to avoid potential ownership conflicts. Issues of water management are particularly important to ensure the protection of water users around IDP camps - for example, when the camp residents need access to water points outside the camp for their livestock, they may come into conflict with the host populations. Negotiation with all stakeholders beforehand may help to minimise potential conflicts.

**Environmental considerations** - are important in the provision of water for livestock in emergencies. Care must be taken to avoid excessive extraction (either through the density of water sources or high extraction rates) which affects the water table; and high concentration of livestock around water points. On the other hand, water provision – when provided in accordance with well-thought-out natural resource management strategies - may have a positive impact on the environment by encouraging more effective natural resource utilisation.

**Water for people versus water for livestock** - it is important to ensure that human water supplies are not contaminated by livestock. Similarly, conflicts between the demands of the human population and their associated livestock will often be an issue. With proper planning and management, it should be possible to create a network of distribution points that will protect the quality of water supplies and meet the demands of both humans and livestock.

### *Key steps and principles for the assessment of water sources*

The key steps and principles for the assessment of water sources are detailed below.

### *Collate background information*

The assessment team should collect and collate relevant background information before it leaves for the field assessment. The collection of background information prior to departure to the field is useful in many ways. First, it allows the team to start to acclimatise to the

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situation on the ground and to gain an overview of the difficulties one may encounter in the field. Gathering of background information should include as a minimum the collection of maps (topographical, geological, hydrogeological, and satellite imagery if possible), land-use and rainfall data, names of other agencies working in the field, and key personnel. This process will allow adequate time to reflect on the prevailing political and demographic situation and what difficulties may arise during the implementation of programs.

A series of at least cursory visits to relevant government agencies, national and regional, local, and in- international NGOs will help to form an opinion of their capabilities, activities, and incumbent strengths and weaknesses.

In carrying out an assessment, the principle should be to collect enough data to implement an effective response. Time spent collecting unnecessary information is time wasted.

### ***Rapid participatory assessment***

Local people usually possess detailed knowledge of water sources, including locations, quality and the available amount of water. Access to water is normally the primary reason for human concentration in any specific area during an emergency and this factor is even more pronounced where livestock are concerned. Consequently, participatory assessment with local or displaced communities and access to indigenous knowledge are paramount. One of the most effective methods for rapidly determining the location, demand, discharge, management issues and alternative sources is participatory mapping; an exercise that may take less than an hour or two even with large groups of people. Various other participatory methods are also useful, including matrix ranking, transect and focus group discussions. The assessment team should be familiar with these participatory methods and know-how to apply them to water source assessments.

In parallel with participatory methods, more formal engineering techniques can be used to confirm local knowledge and to provide specific technical solutions for the provision of water to livestock. These may include, for example, direct observations, structured interviewing, topographical surveying, geo-technical/hydrogeological surveys, laboratory-based analysis of water quality using specialised equipment either in the field or at the nearest urban centre.

### ***Coordination issues***

As a minimum, contact should be maintained with regional government bodies, parastatal, bilateral, UN and NGO agencies with an interest or specific remit within the livestock and pastoralist sector, and those with responsibility within the water supply sector in general.

In any emergency in Kenya the federal DPPA is tasked with coordinating all external interventions, assisted by regional governments. It is important to avoid duplication of effort and/or following antagonistic approaches to providing assistance since this may simply cause more harm than good.

### ***Water source selection and intervention design***

Proper determination and analysis of all known variables and parameters within the time available to the assessor should ensure the selection of the most appropriate single or multiple sources of water. Planned interventions should be negotiated with all relevant stakeholders to avoid conflicts of interest.



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### ***Supply and demand***

The relationship between supply and demand is a simple one and the impact of this relationship will be easily recognisable within days of an acute emergency event. Should demand outstrip supply the first and most obvious indicator will be rapid depletion of livestock assets. Secondly, conflict within the existing population may exacerbate the emergency situation and cause further migration to unsuitable areas where livestock depletion may continue. Rapid assessments of available supplies and demand are therefore required at a very early stage and should the need for water trucking be approved in the short-term, arrangements should be made immediately to avoid such negative scenarios occurring.

Demand assessments should be based on best estimates derived from livestock population figures, local authority records and consultation with locally-affected populations. In addition, livestock traders and middle-men may be able to offer useful information in some areas. Ease of collection of water and its accessibility to animals need to be considered here. If livestock are to drink at the water point, then demand assessments should take into consideration reasonable walking distances to determine the area to be covered by the water point.

The 'storage' of water should not be overlooked in determining the quantity of the most insignificant source. For example, the trickle from a leaky tap could supply enough water to satisfy 180 goats (based on a yield of 0.5 litres/ minute for 12 hours), if captured overnight. The overflow and waste water collected from water points dedicated to human needs is often enough to satisfy household livestock assets provided that proper drainage and delivery troughs are incorporated into water point designs.

### ***Costs associated with water provision***

In deciding whether to rehabilitate, renovate and/or improve the yield of existing water points as opposed to creating new water points the critical parameter is usually defined by the overall cost of delivering a cubic metre of water over the expected duration of the emergency. This type of cost-benefit analysis will quickly determine whether the aims and objectives of the agency are not only realistic but viable in the medium to long term. If relocation or alternative solutions are cheaper than these should be implemented.

### ***Distribution***

To reduce costs, avoid conflict and prevent contamination, access to and the collection of water for livestock should be controlled, efficient and appropriate to the type and number of livestock present.

Distribution networks and watering - to speed the watering of livestock it is recommended that water be transferred from the selected source by an appropriate distribution network to a well-designed and purpose-built watering facility. The physical transfer of water can be achieved through animal or human traction or preferably through an open channel or piped distribution network. The distance from source to watering facility need not be too long. The design of the watering facility will take into consideration the method of delivery from source, the optimal movement and flow of livestock through it, animal holding requirements, drainage, associated management facilities and additional security requirements. Gender and issues relating to vulnerable groups should be taken into account.





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Watering of animals and human activity - in the design of purpose-built watering facilities it is possible to ensure from the very beginning that human activities are effectively separated from livestock watering. In situations where existing facilities are necessarily being used for both live- stock and human consumption basic improvements can be made to separate human activities from livestock watering. Collecting waste water and improving the drainage is often the easiest and fastest way to achieve minimum separation. Gravity and the construction of open channels can be used effectively and cheaply to move water away from the source and point of collection for human populations. Livestock watering facilities should be situated downstream of any further water extraction for human consumption.

Contamination of human water supply by livestock - animals should be stopped from physically entering the water by careful use of troughs, bund walls, parapets, and hard standing areas. Similarly, hard standing areas should be very well-drained to ensure livestock are not made to wade through increasingly thick layers of wet mud.

### ***Water quality and safety***

It is important to ensure that water is basically free of specific water-borne diseases, parasites or vectors and is not contaminated with toxic chemicals. However, water quality for livestock is generally much less of a critical issue than for human consumption (for example, there is no livestock equivalent to a water-borne disease such as cholera, which presents a key water quality challenge for human water supplies). This may offer opportunities for reducing conflict with human demands if high-quality water sources are limited. Poorer quality water from rivers or standing lake water that cannot feasibly or economically be purified for human consumption may be reserved for use by livestock.

Storage, and in particular enclosed storage, flocculation using local products such as moringa, sedimentation and settlement are all cheap and simple forms of treatment that can be applied to water for livestock.

An understanding of turbidity and its measurement should be required of any practitioner working in the field. The ability to measure and compare samples will be useful to even an untrained person.

### ***Local equity and management issues***

The access of women, children and vulnerable groups to water should be protected by the careful management of water sources and distribution points. As the primary users and collectors of water, the involvement of women and vulnerable groups in the design of watering facilities and their management should be sought from the earliest stages. Their active participation in the management of facilities after completion should also be encouraged. The use of participatory methods will help to ensure the views of the poor, illiterate and otherwise vulnerable can be incorporated into the design of systems.

Boreholes as well as shallow and deep wells are usually managed by local (often customary) institutional arrangements, or by private owners or managers of the water source. The rehabilitation of existing water sources or the establishment of new sources should take into account these management systems and fit into them in order to promote sustainable and



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equitable water use. The management of water distribution in water trucking activities can also build on local water management systems to help ensure equitable distribution and access within communities. Where IDP camp residents need access to water for their livestock and must share resources with the host community, negotiations beforehand can help to avoid potential conflict. Establishing clear and equitable management systems for water sources is also important for the longer term - into the recovery phase and beyond; experience has shown that unless these issues are considered at the beginning of the intervention, water sources may fall into disrepair a short time after the end of the emergency.

Watering facilities should be well designed and efficiently managed to avoid unnecessary congestion, inequitable distribution of resources and operation at night or other dangerous periods. Clear guidelines should be set, outlining when and at what times of the day, watering facilities will be operational and how much these services will cost, if indeed charges are to be applied at all.

### ***Long-term management and maintenance***

The planning and provision of regular maintenance should be sufficient to keep facilities operational throughout the emergency period and beyond, and the body assigned for the management of water supplies whether government, agency or community body should be accountable to the users.

A key aspect of maintaining water facilities is ensuring adequate funding for capital expenditure and day to day running costs. In setting water tariffs, costs should be affordable, livestock owners must be willing to pay and there must be a system of penalties for not paying. Vulnerable groups and the poorest should be consulted prior to implementing tariffs.

### ***Environmental issues***

The negative impact of displaced people and their livestock on the natural environment should be minimised as follows:

Waiting times and congestion around water points should be minimised to avoid degradation and destruction of vegetation in the area around the water points. The proper design and location of water distribution facilities will mitigate congestion and unnecessary waiting.

Water points should be kept clean and free from flies and pests, including vectors of diseases, through appropriate design and management. Minimal charges for water should provide adequate incentives for the proper management and day-to-day maintenance and cleaning of water points. Proposals should be discussed before beginning work on construction.

Watering facilities for livestock should be placed downstream of any extraction points for human consumption. Faecal matter from livestock should be kept away from entering secondary watercourses or entering into groundwater sources. Utilisation of dung for fuel, biogas, and/or fertiliser should be encouraged.

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### ***Water trucking***

In some situations the trucking of water may be the only viable approach to ensuring water supply for pastoral livestock during drought. The approach is relatively expensive and has limited sustainability.

Any plan for water trucking should be fully costed and matched against the overall benefit expected for livestock owners including the timeframe and eventual exit strategy.

### ***Management issues***

Staff management and supervision - successful trucking operations require consistent and sustained staff inputs. This includes a need for competent, experienced management and supervision. However, it is also important to ensure that drivers and assistants are kept motivated through proper reimbursement and careful attention to other needs including subsistence allowances and personal security considerations.

**Monitoring deliveries** - with capable and reliable supervisory staff working in collaboration with community leaders it is possible to ensure the correct number and amount of deliveries. Without careful monitoring, it is quick and easy for fraudulent operators to offload supplies along the route and to claim payment for non-delivery unless beneficiaries are made aware of what they are supposed to receive.

**Contracts** - clearly worded contracts should be written and signed between agencies and trucking contractors, specifying delivery targets and mutually acceptable methods for measuring deliveries. Checks should also be made to ensure that no detrimental effects are felt by existing populations due to the withdrawal of trucking facilities from their usual work.

### ***Design issues***

**Selection of water sources** - use of the selected source/s should be approved by all relevant authorities and user groups. Seek local advice regarding the ownership and rights to any proposed water source. Potential water sources often include urban supplies belonging to private companies, schools, churches etc. Should water be extracted from surface water sources such as rivers and lakes then additional arrangements will be necessary for the loading of trucks.

**Trucking routes** - should be surveyed and properly assessed to avoid problems with degradation over time and periods of inclement weather. Before entering into trucking agreements, routes should be identified and surveyed including all bridges, fords and other obstacles. The type and suitability of road surfaces should be assessed noting any possible difficulties due to future inclement weather or gradual degradation of surfaces. The cost of, and methods for dealing with these problems and mitigating against future disruption should be considered as early as possible. Selection and maintenance of fleet and equipment - use only appropriate means of transport, taking into account loading and bearing capacities of trucks and various road surfaces. Consider whether articulated or rigid trucks should be employed. Can flatbed trucks be fitted with secured rigid or flexible tanks? Are tractor-trailers more appropriate? Check what each tanker has been transporting in the past and ensure





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that proper cleaning is undertaken. Qualified mechanics and reliable supplies of uncontaminated fuel need to be available throughout the duration of the trucking operation. This includes any material needed to operate and maintain pumps and containers/delivery equipment. Major issues to consider are:

**Cost and availability of fuel** - ideally, it should be possible for drivers to refuel without making major detours away from the trucking route. This may require fuel to be brought in separately, adding to the logistical complications of the operation. It may also be a consideration in the original selection of water sources.

**Spare parts** - should be readily obtainable. Simple, locally made equipment that is easily repairable is to be preferred to hi-tech or imported solutions.

**These issues** - particularly those relating to maintenance - may affect the decision regarding the type of transport that will be used by the trucking operation e.g., trucks or tractors and trailers with bowsers or bladder tanks.

### *Distribution issues*

In addition to the water distribution issues detailed in section 5.3.3 above, the effective distribution of water from tankers will require:

- Easy access and turn-around space for vehicles
- Good drainage
- Adequate storage
- Easy offloading into communal facilities (i.e. not into individual containers)

It is important to note that initial deliveries should be extremely well managed and well thought out to ensure the safety of agency staff and beneficiaries alike. There may be a great deal of anxiety present among the beneficiaries whose livestock may already be highly stressed and dehydrating fast. These people/animals will be impatient to receive water. It is important to let people know that additional, regular supplies will be arriving after initial deliveries have been made. If possible try to build up adequate stocks of water quickly.

Relocation of livestock is often implemented as part of the response to an emergency situation (either as part of the indigenous response or coordinated by external agencies). Where this is occurring, trucking of water may be required to support the migration. This situation will add considerably to the already complex logistics of water trucking.

### *Monitoring and evaluation*

Monitoring and evaluation systems should be established to ensure that the provision of water is implemented effectively and has a positive impact on livelihoods. The system should be established before implementation begins to enable the correction and adjustment of activities and the collection of data to facilitate learning and impact assessment.

In common with other services, the provision of water can be measured using five key indicators viz. accessibility, availability, affordability, acceptance and quality. These indicators apply to both relief and development interventions, and can be measured using a mix of conventional and participatory methods.



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### *Policy implications*

The need to provide emergency water supplies to livestock, particularly during drought, is indicative of the inadequate long-term development and management of water resources in pastoralist areas. Water development policy needs to take account of the need for better use of water resources while also recognizing the advantages of mobile pastoral livestock production systems and the environmental damage in Kenya caused by the inappropriate provision of water. It is increasingly recognized that inappropriate construction of boreholes, both in terms of location and number, disrupts livestock movements and grazing management.

Experiences of water development for livestock indicate that pastoralists should be involved in the initial analysis of water issues, including predicting the positive and negative impacts of new water sources, and how new facilities will be sustained and managed in the long term. Part of this participatory analysis relates to broader natural resource management issues such as dry season grazing practices and areas that traditionally, are preserved for dry season use.

### *Daily water requirements for livestock*

To estimate the approximate needs of the livestock population in the area, figures in Table 2.63 for daily water requirements may serve as a rough guide:

Table 2.63. Daily water requirements for livestock		
Type of Livestock	Average water requirement (litres)	Frequency of drinking
Camels	60-80	Every 4-5 days or longer
Cattle	30-40	Every 1-3 days
Equines (donkeys, mules, horses)	15-25	1-2 days
Sheep	4-5	1-2 days
Goats	4-5	Preferably once a day
Pigs	0.5-2.5	Preferably once a day
Poultry	0.05-0.15	At least once a day

Table 2.64 gives an indication of the discharge rate from traditional and modern wells and boreholes, to show the approximate number of livestock each can serve:

Table 2.64. Water discharge from traditional and modern wells and boreholes					
Water source	Litres/hour	Water discharge		Number Cattle*	of animals Sheep/goats
		Max hours/day	Total litres/day		
Traditional well	1,000	7	7,000	280	1,400
Modern well	5,000	15	75,000	3,000	15,000
Borehole	>20,000	20	400,000	16,000	80,000
* Based on an ave consumption of 25 litres/day; + Based on an ave consumption of 5 litres/day					



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