

Climate Smart Initiative: Area Closure

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Element	Guiding questions
Type of document	Good Practice
Publisher	FAO and The Ministry of Agriculture and Natural Resources, Ethiopia
Target audience	Policymakers, practitioners and researchers in the area of climate change adaptation & mitigation and watershed management in East Africa
Objective	The aim of area closures is to prevent further degradation of the ecosystems, advance re-vegetation / forest regeneration, and restore the overall ecological conditions of the area. This is done by closing off areas from interference and damage by both humans and animals to allow for natural regeneration of the land.
Location /geographical coverage	This is a national initiative that was implemented in the context of Ethiopia’s Productive Safety Nets Programme (PSNP). The PSNP provides payments to able-bodied household members for participation in labour-intensive public works. The Government of Ethiopia launched the PSNP in 2005, to provide transfers of cash or food, to food-insecure people, who in turn provide labor in public works projects. The PSNP’s public works (PW) program is designed to address a key underlying cause of food insecurity, which is believed to be environmental degradation. To address this, PSNP-PW projects focus on soil and water conservation activities, along with roads, irrigation and other social infrastructure facilities such as health and education. The implementation plan was developed within a participatory (micro) watershed management planning framework ¹ .
Introduction	The majority of Ethiopians live in rural areas as subsistence farmers and pastoralists relying on agriculture and livestock for their livelihoods ² . However, population growth has led to a number of problems related to inappropriate cultivation, overgrazing, deforestation, soil erosion, soil fertility decline, water scarcity, lack of pasture, and a fuelwood crisis ³ . High seasonal climate variability as well as occurrence of weather extremes such as droughts and floods place the livelihoods and food security of Ethiopian smallholder farmers in a precarious situation, compounded by the challenges of natural resource degradation. Demographic pressure in Ethiopia’s part of the Nile Basin has resulted in tremendous pressure on natural resources to account for the increasing food and energy demand. This results in a rapidly increasing demand on productive use of both land and freshwater resources. In addition,

¹ <http://www.moa.gov.et/documents/93665/10354259/PSNP-III-PWIA+-Report+Final.pdf/ced3293f-5d0a-45be-aa51-e69bc699892e>

² http://www.ltsi.co.uk/images/M_images/PSNP%20Coping%20with%20Change.pdf

³ Adapting to climate change through land and water management in Eastern Africa

it is estimated that up to 10% of the country's population is chronically food insecure⁴. While Ethiopia's economy has been steadily growing, it is recognized that agriculture (particularly smallholder) and natural resources management play a central role in the livelihoods and resilience of the majority of Ethiopians.

In the past, food aid was the main response to threats and crises such as drought. However, this is now known to be unsustainable and there is a shift to a more integrated manner of resilience to hazards and shocks, which involves among others social protection measures, natural resources management, early warning, disaster preparedness and development of appropriate response measures.

The Government of Ethiopia's Food Security Programme aimed to address these challenges and brought about The Productive Safety Net Programme (PSNP) and The Household Asset Building Programme (HABP) as a means of primarily providing social protection to chronically food insecure households through a cash for work programme. The cash for work programme targets initiatives to restore and conserve degraded community land through practices such as soil and water conservation measures, area closure and reforestation through a (micro) watershed management approach.

Area closure, the good practice described in this paper, is a practice applied on degraded land that has lost (most of) its vegetative cover and that has extremely low soil fertility. Area enclosure refers to the practice of land management whereby livestock and humans are excluded from accessing a severely degraded area of land. The purpose of exclusion of animals and humans is to prevent further degradation of the ecosystems, advance re-vegetation / forest regeneration, and restore the overall ecological conditions of the area. This enhances the growth of grass and woody vegetation and helps to rehabilitate specified area and improves the microclimate, which is a strong climate adaptation mechanism. Moreover, area enclosure is an intervention measure that boosts land productivity and plays a key role in carbon sequestration, therefore mitigating climate change as well.

The practice is in line with Ethiopia's Climate Resilient Green Economy Strategy (CRGE, 2010) that calls for "*Promoting area closure via rehabilitation of degraded pastureland and farmland, leading to enhanced soil fertility and thereby ensuring additional carbon sequestration (above and below ground)*" as one of the strategies for protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks.

Stakeholders and Partners*

The target beneficiaries are the largely chronically food insecure smallholder farmers who rely on the land and natural resources for agriculture and food security. The community members, while being the main beneficiaries of the programme are also major partners whose involvement is crucial for the implementation and sustainability of the area closures and their associated practices.

⁴ [https://www.dppc.gov.et/downloadable/reports/Early_warning/DRR%20DAY-2014/CSI%20presentation%20\(MoA\).pptx](https://www.dppc.gov.et/downloadable/reports/Early_warning/DRR%20DAY-2014/CSI%20presentation%20(MoA).pptx)

	<p>It is estimated that approximately 45,000 public works projects are completed every year, the majority of which involve area enclosures and soil and water conservation⁵.</p> <p>In terms of gender, women make up 25-50% of participants in the PSNP programme. Women are involved in labour activities and decision making structures related to area enclosures and watershed management as a whole, however challenges have been noted in ensuring that women's participation is not limited due to their already existing domestic responsibilities⁶.</p> <p>The CSI initiative within which these area closures have been implemented has numerous partners with the World Bank as the main donor for the programme, which is implemented by a consortium of organisations including CARE, SNV, Farm Africa, ORDA, REST and Mercy Corps among others who support this Government of Ethiopia initiative. The PSNP as a whole is funded by numerous donors.</p>
<p>Methodological Approach*</p>	<p>Degraded land is closed from human and animal interferences for at least 3 - 5 years in order to ensure rehabilitation of the land. Sustainable Land Management (SLM) measures such as terracing, enrichment plantation and over-sowing of grass are among the activities that are often undertaken along with the area closure. These practices enhance growth of natural vegetation and enrich biodiversity.</p> <p>The area to be closed is first identified in participation with development agents, community leaders and community members. According to one study⁷, the most important criterion for site selection was the extent of land degradation as evaluated by villagers and development agents, implying that the more an area is degraded, the more likely it is to be enclosed for regeneration.</p> <p>Awareness activities are undertaken to make local communities understand the methods and benefits of area enclosures. Development agents in collaboration with community leaders call a general community meeting and discuss the plan and its implementation on degraded land and community members have an opportunity to voice their concerns and opinions. Both men and women are involved in the community consultations and awareness raising activities.</p> <p>The area to be closed is then demarcated and fenced, in most cases with living fences and guard duties assigned. The demarcation and fencing are conducted largely using labour from the local community on a cash for work basis and with involvement of the local administration and development agents.</p>

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/480617/Ethiopia_PSNP4_case_study.pdf

⁶ Is Climate-Smart Agriculture effective? A review of selected cases, CCAFS Working Paper No. 129

<https://cgspace.cgiar.org/rest/bitstreams/58510/retrieve>

⁷ Assessing Farmers' Perception of Enclosures, Kewot District, Northeastern Ethiopia

<http://article.sciencepublishinggroup.com/pdf/10.11648.j.ijep.20150306.11.pdf>

The area closures implemented are mainly of two types:

1. Only closing the area from interferences of human interventions (leaving it to natural regeneration), and
2. Closing off degraded land while simultaneously implementing additional measures such as planting of tree seedlings, mulching and establishing water harvesting structures to enhance and speed up the regeneration process.

In the context of the PSNP-Climate Smart Initiative the second type is more common and is conducted in conjunction with various additional measures, aimed at improving the incomes, productivity and resilience of the communities. In some cases a percentage of the area enclosed is left to naturally regenerate while a larger percentage is treated with additional soil and water conservation measures.

In principle, area closure requires locally available materials and labor from the local community. Local communities are expected to bring their own hand tools and equipment during the fencing and plantation of area closure. Planting materials can be prepared at any nursery nearby and/or by an organized group of farmers on temporary nursery sites. Some money is required to cover the costs for the guards, if necessary. However, recently fencing and guarding are abandoned in favor of the establishment of local rules. For example, local by-laws have been used to regulate and protect enclosures from trespassers, livestock encroachment and deforestation. One who violates the rule will be punished and the *kebele* administration will confiscate illegally cut trees, for example.

There is also a maintenance component for area enclosures which involves activities such as replanting, maintaining of fences, pruning of trees and weeding. Some periodic repairs may be needed to physical structures.

For the effective implementation of area closures, a guideline⁸ was developed by the Ministry of Agriculture's (MoA) Natural Resource Management Directorate, which has been adopted by regions based on their regional context.

Validation*

Various studies have been conducted on the value of area closures in Ethiopia, all generally with indication that the practice has both economic and environmental benefits as well benefits in terms of resilience and adaptation to climate change. It has also been found that in most cases community members also see the value of area closures. For example, an evaluation of the perception of community members to area closures in Kewot District, Northeastern Ethiopia⁹ showed that communities believe that the enclosures provided social, economic and environmental benefits and that area enclosure was generally perceived positively.

Area closure has been practiced in seriously degraded watersheds and the rehabilitation activities are (partly) implemented through community mass-

⁸ <https://nrmdblog.wordpress.com/2016/04/16/enclosed-and-rehabilitated-area-management-guideline-draft/>

⁹ Assessing Farmers' Perception of Enclosures, Kewot District, Northeastern Ethiopia <http://article.sciencepublishinggroup.com/pdf/10.11648.j.ijep.20150306.11.pdf>

	<p>mobilization efforts. Local people expressed their opinion that the enclosures' had increased grass cover, decreased soil erosion, and increased water availability following the regeneration of vegetation on the degraded lands, particularly emphasizing the benefits gained from reduced soil erosion on the lower slopes of the watersheds (CSI 2015).</p> <p>It has also been found that the rate at which closed areas regenerate depends on the degree of degradation, climatic factors and the scale of management it receives. Experience shows that well managed area enclosures rehabilitate fast when compared with poorly managed ones with few enforcement mechanisms.</p>
<p>Impact*</p>	<p>Household, village and community level impacts</p> <p>Area closure directly or indirectly contributes to the improvement of rural incomes and livelihoods. The long term benefits can be tremendous, especially in areas where productive land is scarce. It is expected that land previously unfit for production can be used again after 3-5 years of closure though full rehabilitation can take 7-10 years depending on the species and type of vegetation within the enclosure. In some cases if properly managed and if appropriate fodder species are planted, community members can begin cut and carry of fodder for livestock within one year of the closure of the land¹⁰.</p> <p>Medium to long term benefits include increased wood and vegetation cover, increased availability of fodder for livestock feed, medicinal plants and bee forage, providing additional income sources and savings. If cash crops, trees or fodder bushes are grown on terraces and benches, farmers will receive income in the short and/or medium term, depending on the time needed for the first harvest. Wood for construction will become available to the community members after approximately 7 years of regeneration.</p> <p>Moreover, enclosures are usually integrated with other natural resource management activities such as promotion of wood saving and solar stoves, cropland management, grazing land management, development of bio-fuels, agro-forestry, apiculture, animal fattening and organisation of farmers. These have a combined positive impact on the livelihoods of local people.</p> <p>Area closure is critically important to improve the productivity of downstream farmlands and provide protection against floods. It contributes to the reduction of flood damage caused to reservoirs, villages and communities. The productivity of croplands is increased as a result of erosion control, improved soil depths and better soil quality and moisture content.</p>

¹⁰ file:///C:/Users/grey/Downloads/WOCAT_QT_Summary-T_ETH025en.pdf



Figure XX: Income generating activities (beekeeping) in rehabilitated areas of Halaba special woreda



Figure XX: Enclosure as source of fodder, grass is harvested via cut-and carry from the enclosed area

Environmental / ecosystem impacts

Through reduced land degradation, area closures can significantly reduce sediment loads coming from eroded upstream crop and rangelands. From both the small-scale effects and the larger landscape scale, it can be concluded that enclosures are an efficient soil conservation tool. Significantly lower runoff coefficients and increased soil moisture availability are demonstrated in area closure sites when compared to degraded lands that are not closed off. Higher infiltration in enclosures is furthermore creating more favorable conditions for plant growth. On a landscape scale, highly erosive peak flows from steep slopes will be reduced by applying this good practice.

Above ground biomass has been found to increase significantly on land under area closure indicating an increase in carbon stock. The presence of young vegetation has also been found to increase indicating good regeneration of

vegetation.

The re-establishment of natural habitat furthermore offers an opportunity to realize significant biodiversity outcomes and improvement of wildlife habitat, floral and faunal diversity, and further enhance natural regeneration through improved seed dispersal. Areas that were previously degraded farmlands or grazing lands have regenerated to either dense or open woodlands with the subsequent substantial improvement in the vegetation cover. For instance, in Wanja-Asore and Ushe watersheds that have been closed (and subsequently re-opened), warthogs and baboons have come back (CSI 2015). Some of the flora that regenerated after the area closures include *Podocarpus spp.*, *Olea spp.*, *Juniperous spp.*, *Croton spp*, *Vernonia spp*, *Euphorbia spp*, *Entada spp*, *Carisa Spp.*, *Dodonea spp.* etc (PWIA 2014).

Springs are also re-emerging after falling dry two or three decades ago. The rise in ground water made irrigation more accessible, as farmers in some of the micro-watersheds started to dig wells – which has a positive impact on their incomes. Area closure management does not only revitalize dried springs and streams but also boosts the volume of the discharge brought through the initiation and promotion of small scale irrigation practices. This in return improves livelihoods and contributes to food security efforts. In general, the strategy has boosted the yield of ground water and increased the ground water table in many catchments, so that communities have better opportunities to access water for domestic use and income generating activities.

A cost benefit analysis conducted on area closure as a practice showed that the practice has a positive net present value (NPV) and that its benefit to cost ratio (BCR) varied between 4.6 to 54.3; i.e. a Birr or a dollar investment will bring at least 4 Birr or 4 dollars; through carbon credit (PWA 2014). These economic benefits are in addition to the CO₂ sequestration benefits that accrue as the land fills with vegetation.

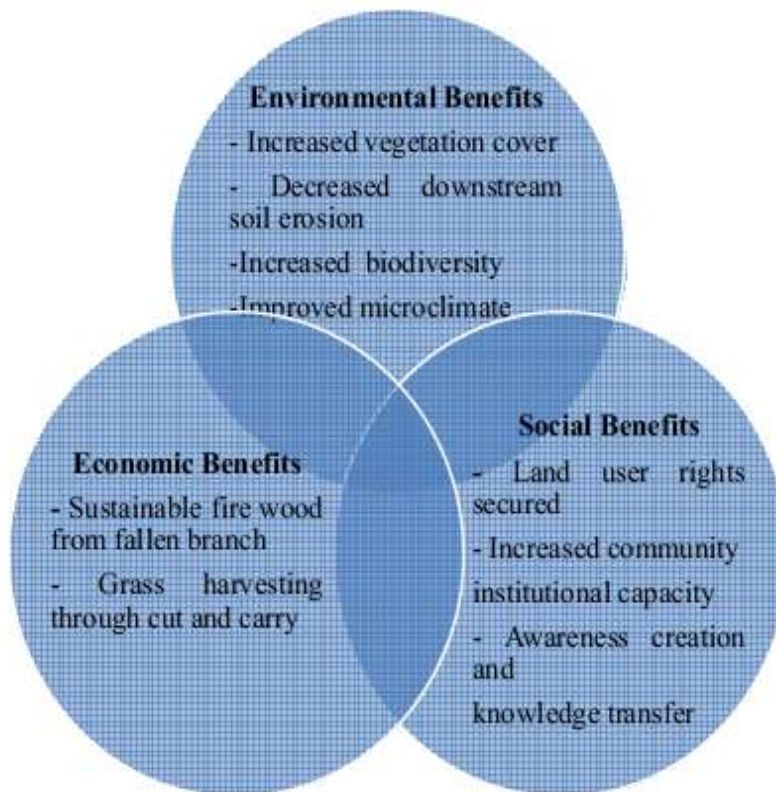


Figure XX: Contribution of area closures to the 3 pillars of sustainable development¹¹

Innovation

The linking of area closure with other natural resource management, soil and water conservation and livelihood diversification practices has been the biggest innovation that has contributed to the sustainability, acceptability and broader impact of the practice in terms of environmental, social and economic aspects in addition to climate change adaptation and mitigation benefits. For example, in some instances beekeeping has been linked to area closure as the practice does not result in damage to the closed off area, while beekeeping provides an alternate income and contributes to resilience to climate change through livelihood diversification. This ensures that the practice of area closures contributes to both climate change adaptation and mitigation.

Success Factors *

Area closures work best when considered in the context of a dynamic mix of practices aimed at providing multiple benefits in terms of adaptation, resilience, productivity, livelihood diversification in addition to climate change mitigation. Supporting households and communities to practice beekeeping and small-scale irrigation can help offset potential short term losses of income from closed off land while at the same time making households more resilient to climate change. Supporting soil and water conservation measures can help reduce soil erosion and surface runoff while aiding infiltration and hence improving ground water levels. These all help to bring better acceptability and sustainability of area closures.

Good community engagement, involvement and awareness raising on the

¹¹ Feasibility of PSNP-PW enclosures for CDM and the World Bank Bio-carbon Funding

	<p>value of area closures both for the environment and for their livelihoods is crucial for success of the practice. In many cases, the communities themselves have formulated locally agreed upon rules and regulations regarding land for area closure and such initiatives contribute to the success of the practice.</p>
<p>Constraints*</p>	<ul style="list-style-type: none"> • Communal lands in Ethiopia are largely used for livestock grazing and it can be difficult to convince the communities about the benefits of area closures. In many cases due to the large need for grazing land and the expansion of cultivation of crops in former grazing areas, hillsides that were previously covered with trees have been transformed to grazing areas. Continuously increasing livestock numbers and shortages of animal feed are a critical problem throughout the country. The demand for fuel wood and wood for construction is also posing a challenge. • The concept of benefit sharing for different community members and groups can be a challenge as one group/person may realize tangible benefits of area closure while another group/person may not and hence will not see the value. Therefore there can be some resistance from local communities to area closure, which has been observed when the area was used for grazing their livestock. To address this, participatory approaches in the identification of land for area closure as part of a broader watershed management plan are used, while sensitization and awareness raising on the short and long term benefits of area closures are conducted by development agents. • Low survival rate of some trees and shrubs has been cited as a challenge, however, communities are now realizing the value of caring for the trees and shrubs as a long term investment in their livelihoods and resilience and not just as a land conservation measure. The use of locally appropriate trees and shrubs and investments in water harvesting structures also help to increase the survival rates.
<p>Lessons learned *</p>	<ul style="list-style-type: none"> • The practice of area closure can be used and is suitable for all areas where land degradation has taken place. While fallowing has in the past been practiced by local communities, the practice of area closure in the modern context with its associated add-ons is fairly new to communities and requires a lot of community engagement, awareness raising and education on the benefits - particularly since demand for agricultural and grazing land is greater than ever. • At the start of conducting area closures in Ethiopia, the practice involved only the closing off the area from external interference by fencing to allow natural regeneration to take place. Currently, a range of other sustainable land management activities such as tree planting, sowing with grasses, establishment of physical structures soil and water conservation structures, rainwater harvesting and even support to conduct small-scale irrigation outside of the area closure are all included as part of a package approach. • The advantage of area closure in comparison to other SLM technologies is that humans or animals will not disturb the recovery of the degraded land. If people, in addition to the closure of the area, install other SLM measures, like contour strips, the land will recover quickly. • The targeting of larger area enclosures is being explored as these can have added benefits in terms of mitigation and income as can possibly

	<p>also qualify for carbon credits – for example through REDD+. In the second phase of the CSI, eight out of the ten enclosures are expected to qualify for carbon projects like REDD, as the size of enclosures is greater than 30 ha.</p> <ul style="list-style-type: none"> • While area closures and the additional support practices are highly valued they must be implemented in the context of a rising population, youth unemployment, gender equity, competition for land and other challenges which either directly or indirectly can lead to lack of sustainability of area closures.
Sustainability*	<p>As with many other practices involving shared resources (in this case community land) the key issue for sustainability of the approach is involvement and ownership by farmers of the process and the results. For this to happen a participatory process is used in the identification of the land for area closure as well as in the implementation, enforcement and maintenance of the area. Extensive community engagement, awareness raising and sensitization is needed on the issue of area closure and its benefits before coming to agreement on where to implement the practice and on how much land.</p> <p>The multiple benefits, identified from implementing area closures, show the sustainability while the fact that some farmers and communities have begun implementing area closures by their own initiative is even more evidence of this. Area closures can be implemented at low cost by communities although support may be needed in the initial stages.</p> <p>The practice of area closure meets the following criteria – stated in the SLM Best Practices Concept and Manual:</p> <ul style="list-style-type: none"> • Acceptance • Effectiveness • Efficiency • Relevancy • Sustainability • Replicability <p>Proposed interventions are always screened using the Environmental and Social management framework (ESMF) guideline to check whether they could have adverse environmental and social impacts. This shows a due attention to the safeguard of environmental and social issues.</p>
Replicability and/or up-scaling *	<p>It should be noted that the practice of area closure is suited to highly degraded land (due to human activity) with low productivity. The second phase of the CSI aims for larger area closures with possibility of qualifying for carbon credit programmes and this is a factor that can aid replicability and sustainability in other parts of the country.</p>
Conclusion*	<p>Area closure is a very suitable and in most cases a very necessary practice for areas that are highly degraded and not very productive. Area closures should be conducted in association with various other soil and water conservation practices such as trenches, terraces and tied ridges as part of a broader watershed management plan. Area closures integrated with other natural resource and income generating activities such as soil and water conservation, promotion of wood saving and solar stoves, crop land management, grazing land management plans, agro-forestry, apiculture, fodder production and</p>

	<p>community capacity building show greatest success and sustainability.</p> <p>Closed land has shown to become productive again 3-5 years of area closure, and even sooner if additional soil and water management practices are implemented in tandem. Area closure is a practice, however, which should be accompanied by a lot of awareness raising and sensitization to enable farmers to understand the long term benefits of the practice. In addition, initial external support to implement the practice is necessary as in most cases, farmers cannot afford the costs associated with the fencing, guarding, and additional SLM measures, if required.</p> <p>In terms of supporting climate change adaptation and mitigation, area closure has emerged as a viable option to restore ecosystems and sequester CO2 with possibility for qualifying for carbon credit programmes. Incorporation of practices such as beekeeping, water harvesting and fodder production in area closures offers an opportunity for climate change resilience. The enclosed areas once regenerated also help to regulate water flow and minimize incidence of flash floods while also promoting rainwater infiltration, soil water storage and improved water tables hence improved availability of water during drought.</p>
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Related resources that have been developed	<ul style="list-style-type: none"> • Climate Smart Initiative II (2015). 'Aboveground biomass and carbon stock of PSNP area closures in six Regional States of Ethiopia', Addis Ababa, Ethiopia. • Climate Smart Initiative II (2015). 'Feasibility of PSNP-PW enclosures for CDM and the World Bank Bio-carbon Funding' • Edward Stevens (edit) (2015). 'GIZ Ethiopia: Lessons and Experiences in SLM', Sustainable Land Management (GIZ-SLM) Programme, Addis Ababa, Ethiopia. Published by GIZ Ethiopia, www.slmethiopia.info.et • The FDRE MoA (2014). 'Productive Safety Net Program, Phase III 2014 Public Works Impact Assessment Report', www.moa.gov.et • The FDRE MoA (2014). 'Productive Safety Net Program, Public Works Review', Addis Ababa, Ethiopia. • https://nrmdblog.wordpress.com/2016/04/16/enclosed-and-rehabilitated-area-management-guideline_draft/