

LEARNING NOTE



DREAM II LEARNING EVENTS

31-August-2021

Leveraging Integrated Planning for
Gully Control near Jigjiga City





DREAM II LEARNING EVENTS

The DREAM Learning Event number V was organized on 31 August 2021 as one in a series of run up events for the Development of Resilience Empowering Alternative Measures in Arid and Semi-arid Lowlands of Ethiopia Conference (DREAM II). The DREAM Learning Events are meant to create connections between different organizations working on lowland development, to share experience and discuss the scaling of the good practices. For further details on the learning events, presentations and full proceedings, kindly visit the DREAM SDR website <https://sdr-africa.com/>

The fifth Learning Event addressed the needs for, and added values of integrated planning in controlling gullies around the vicinity of Jigjiga City – a strategically important and fast growing urban area of Ethiopia. The experts and participants presented and discussed various aspects of gully control, ranging from understanding root causes, effective solutions to mobilization of resources and institutions for actions. This learning note summarizes the main findings.

The speakers at the Learning Event were:

Dr. Abdulkadir, Somali Region Agriculture & Natural Resource Development Bureau

Dr. Elisabeth van den Akker - GIZ-SDR Programme

Dr. Taye Alemayehu, MetaMeta Ethiopia

Girma Senbeta and Solomon Yilma, MetaMeta Ethiopia

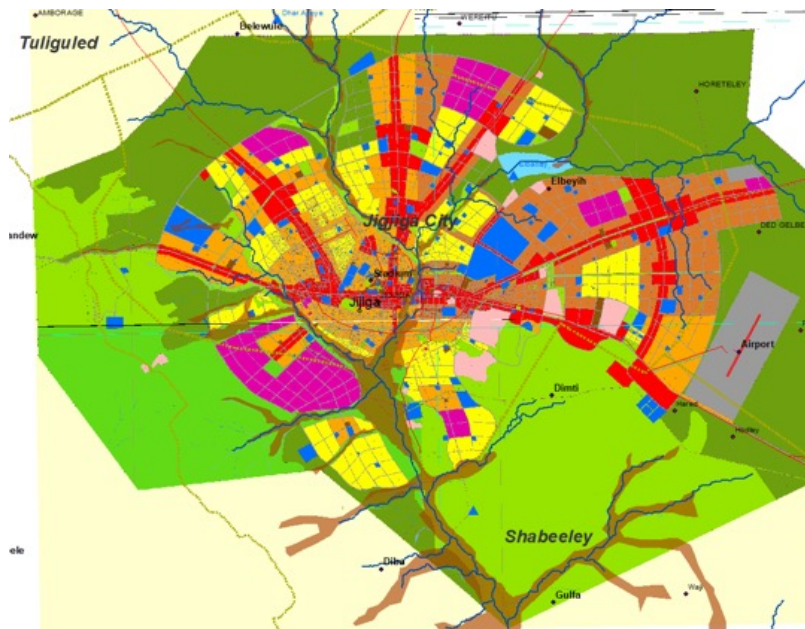
Assefa Kumsa, MetaMeta Ethiopia

Dr. Frank van Steenberg, MetaMeta Research

KEY MESSAGES

- A gully is a channel resulting from erosion and caused by concentrated but intermittent flow of water, usually during and immediately following heavy rains. The West and Southern parts of Jigjiga currently experience gullies development, and the impacts are visible. Growing gullies damage productive arable land by cutting through the landscape, lowering the groundwater table, and making the land drier. Furthermore, gullies damage infrastructures on the ground and limit access to the farm. Some of the large and fast growing gullies like the Shek Ali Gure are moving towards the city, and in a time span of 10 year they will directly affect city settlements and infrastructure. The need to control gully is strong, and urgent.
- Gully control requires, first and foremost, proper understanding of the complex processes driving gully forming and development. Appearing as a mere biophysical process, rapidly accelerating gully erosion around Jigjiga is a complex manifestation of multiple processes including geological changes, land-use transitions, unsustainable resources management (water, soil, stone for construction, etc.), and insufficient resources (finance, institution, human). Here the role of regional planning in gully control is emphasized, since this work requires to properly address all driving factors involved. Integrated regional planning helps to avoid the common tendency to focus solely on biophysical processes and infrastructures, which has shown to be insufficient to deal with the scale and complexity of the problem at hand.
- To prevent and control gullies, a number of measures are available:

- o Build control structures, including stone masonry, gabion check dams and water spreading weirs. It is important to allocate resources and mandate to maintain these control structures after construction.
- o Create suitable institutional arrangements to manage gully control, in coordination with other activities. A steering committee and the technical taskforce dedicated to gully control should be established. Together with a secretariat office, the committee and the taskforce can serve as a tool for coordination, cooperation, and capacitation.
- o Mobilize resources and coordinate management objectives between existing development programs and agents. Creating a thematic joint program between the Lowland Resilience Project (LLRP), Productive Safety Net Program (PSNP), Development Response to Displaced Impact Project (DRDIP), Strengthening Drought Resilience in Pastoral and Agro-Pastoral Communities (SDR) is helpful to optimally mobilize resources and efforts to address gully erosion. This should be institutionalized by MoUs, and specifying leading agency.



Projected land use for 2021-2030 in Jigjiga. Credit: Dr. Taye Alemayehu

1. UNDERSTANDING THE COMPLEXITY OF GULLY FORMING AND DEVELOPMENT

A gully is a channel resulting from erosion and caused by concentrated but intermittent flow of water, usually during and immediately following heavy rains. The West and Southern parts of Jigjiga currently experience gullies development. Some of the large and fast growing gullies like the Shek Ali Gure are moving towards the city, and in a time span of 10 year they will directly affect city settlements and infrastructure.

Growing gullies create many unwanted impacts for the ecosystem, landscape and human activities. They damage productive arable land by cutting through the landscape, lowering the groundwater table, and making the land drier. Furthermore, gullies damage infrastructures on the ground and limit access of farmers to their farms.



Picture: The Shek Ali Gure gully is moving fast towards Jigjiga city. Credit: Girma S. and Solomon Y.



Picture: A gully threatening main traffic road in Boldid area. Credit: Girma S. and Solomon Y.

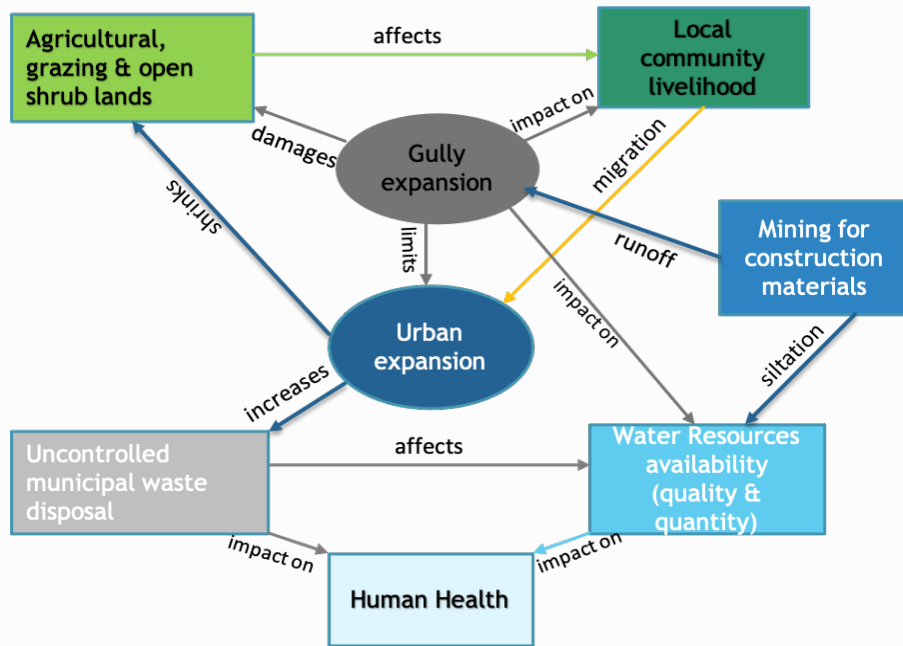
Appearing as a mere biophysical process, rapidly accelerating gully erosion around Jigjiga is a complex manifestation of multiple processes including geological changes, land-use transitions, unsustainable resources management (water, soil, stone for construction etc.), and insufficient resources (finance, institution, human).

- Regarding geological characteristics, the soluble and karstified carbonate rocks underlying the recent sediments are playing a big role in accelerated gully development, and in the failure of WSW and gully protection structures. Deep-cut gully opening over such rocks affects the groundwater condition and makes the area around gullies drier, as the moisture is washed away. Topography also play a role, where generally

steep slopes in the western and northeastern areas around Jigjiga are more prone to gully formation.

- Regarding rainfall, the elevated western and northeastern parts of the watershed receive relatively more rainfall which make them more vulnerable. Furthermore, the high intensity rainfalls that are frequently occurring in recent years are making all parts of the watershed prone to flood hazard and gully development. In the future, the situation might worsen as rainfall patterns will be more erratic.
- Soils around Jigjiga, which is dominantly sandy on the top layer, make the whole area prone to erosion and intensive surface runoff. These are important conditions for gullies to form, and grow under heavy rainfall.
- Land-use transitions, characterized by rapid conversion from grazing and natural land to farm land and urban settlements, significantly accelerate gully erosion.
- Unsustainable resources management, including bad agricultural practices, deforestation, and quarry mining all contribute to gully erosion. These processes remove the land's vegetative cover, exposing the top soil and create stronger surface runoff, leading to intensified erosion.

All in all, it is important to stress the fact that gully forming and development are driven by both biophysical and human processes. Several of these processes are intensifying, including rainfall, urbanization, land use transitions and other socio-economic activities. This implies that gully erosion will intensify and the damage will exacerbate unless effective and timely actions are implemented.



Picture: Watershed processes and interrelationships - causes and effects of gully forming and expansion. Credit: Assefa Kumsa.



Picture: Damage by Shak Ali Gure gully. Credit: Girma Senbeta

2. USING CONTROL STRUCTURES TO ADDRESS GULLY EROSION

A number of control structures are available to prevent and mitigate gully erosion. The most important structures are check dams, water spreading weirs and road water management. These structures help to stabilize the gullies, and regulate the surface runoff volume and peak rates. It is important that they are located in the right area in the catchment. For instance, placing check dams in the mid-reach of the catchment often do not help controlling erosion, as the flood water is already concentrated and has gained erosive potential in the upper catchments. Technical and geological inspections should also be done in advance to guide the location and design of the control structure.



Picture: Check dam damaged by growing gullies. Credit: Girma Senbeta

Water spreading weirs are useful to control gullies and rehabilitate damaged drylands. It is important that the weirs are supported with vegetative measures, for instance growing grass to stabilize the structure and implemented in combination with upstream measures. Control structures require constant maintenance and upkeep to sustain their efficacy. In particular, water spreading weirs require frequent checkups and small damages should be fixed on time before the whole structure is affected. Check dams and water spreading weirs should be heightened when necessary, as the captured sediment will gradually fill up over time. This is now the case for the Kamara cascade.



Picture: Water spreading weirs to control erosion and 'plug' the gullies with sediment in Bolidid. Credit: Girma Senbeta

Road water management is also very important to consider and has multiple advantages including improving road safety, minimize soil and gully erosion, water harvesting for agriculture, water supply for human and livestock, and Groundwater recharge. An example of water storage created from road water source is shown in the below picture.



Picture: Road water harvesting contributes to soil water conservation and erosion control. Credit: Girma Senbeta

While control infrastructures are effective and necessary to control gully erosions, they should not be treated as the complete solution to the problem. Experience shows that solely infrastructural solutions are not enough to reverse the prevailing situation. Furthermore, the accelerating process of

gully forming and expansion would require huge amount of resources and investment if only control structures are to be leveraged. Experts therefore recommended to compliment gully control infrastructures with a range of non-structural measures, to be discussed in Section 3.

3. NON-INFRASTRUCTURAL MEASURES FOR GULLY CONTROL

Non-infrastructural measures are highly important for controlling gullies. They complement and enhance the effectiveness of infrastructural measures.

CONTROL HARMFUL DEVELOPMENT ACTIVITIES

To control excessive runoff and erosion, deforestation has to be halted. To do this, the local communities need to be provided with alternative energy sources, to reduce pressure on shrubs and forests. Additionally, overgrazing should be minimized. Campaigns to build awareness will be useful to effectively manage quantity and quality of livestock in the area. Furthermore, efforts should be paid on providing alternative livelihoods, to reduce the environmental pressure of current practices on the natural system. Building livelihoods around the circular economy concept is an important lead in this regard. Particularly, the following livelihood models should be piloted and promoted: beekeeping, beeswax processing, fodder production, nursery development, livestock fattening, and use of alternative energy (biogas, solar). Lastly, attention should be paid to proper designs of access road to quarry and farm sites.



Picture: area closure to avoid grazeland degradation and erosion. Credit: Girma Senbeta



Picture: Cut and carry system for fodder production. Credit: Girma Senbeta

STRENGTHEN AND ESTABLISH NEW INSTITUTIONAL ARRANGEMENTS FOR GULLY CONTROL

The important task of preventing and controlling gullies in Jigjiga, as well as in much of the rest of Ethiopia, calls for stronger institutional capacities to drive decisions and actions. First, there is a need to create suitable institutional arrangements to manage gully control, in coordination with other activities. A steering committee and the technical taskforce dedicated to gully control should be established. Together with a secretariat office, the committee and the taskforce can serve as a tool for coordination, cooperation, and capacitation.

Improved institutional capacities should also focus on cross-project and cross-program integration of activities and resources for gully control. Large potential lies in the mobilization of resources and in coordinating between existing development programs and agents. It is helpful to create a thematic joint program between the Lowland Resilience Project (LLRP), Productive Safety Net Program (PSNP), Development Response to Displaced Impact Project (DRDIP), Strengthening Drought Resilience in Pastoral and Agro-Pastoral Communities (SDR) to optimally mobilize resources and efforts to address gully erosion. This should be institutionalized by MoUs, and specifying leading agency.

