SATREPS-MNGD Project in Ethiopia: improving rural road infrastructure

Background

Since 2019, seven institutions from Ethiopia and Japan have been implementing a joint project that focuses on improving rural road infrastructure in Ethiopia. The seven institutions are Addis Ababa Science and Technology University (AASTU), Jinka University (JKU), Ethiopian Roads Authority, Kyoto University, University of Miyazaki, Ehime University, and Nagoya Institute of Technology. The project came be known as SATREPS-MNGD. SATREPS (Science and Technology Research Partnership for Sustainable Development) is the Japanese government's program that promotes international joint research. The title of the Ethiopian SATREPS is "Project for Development and Operation Model of Plant-derived Soil Additives for Road Disaster Reduction on Problematic Soil." Since this title is too long and its acronym cumbersome, another working title "Making Network for Global Development" (MNGD) has been adopted and the abbreviation is intentionally pronounced as *Menged*, which means road in the Ethiopian lingua franca.

The SATREPS-MNGD project focuses on addressing the difficulties of road construction and maintenance on expansive soil. This is because expansive soil swells when it absorbs water during the rainy season and shrinks when it loses moisture during the dry season, and such drastic changes in the volume of soil cause road disasters, which constrain the mobility of people, economic activities and the provision of different services. The conventional solution to road disasters is mixing cement with the expansive soil or replacing it with other weightier soil. However, this approach requires the allocation of significant budget, which is not suitable and realistic for developing countries like Ethiopia. Therefore, the goal of the project is to find simple, inexpensive and convenient methods to construct and maintain roads thereby contributing to the mission of the Universal Rural Road Access Program (URRAP), which is connecting all kebeles in Ethiopia by all-weather roads.

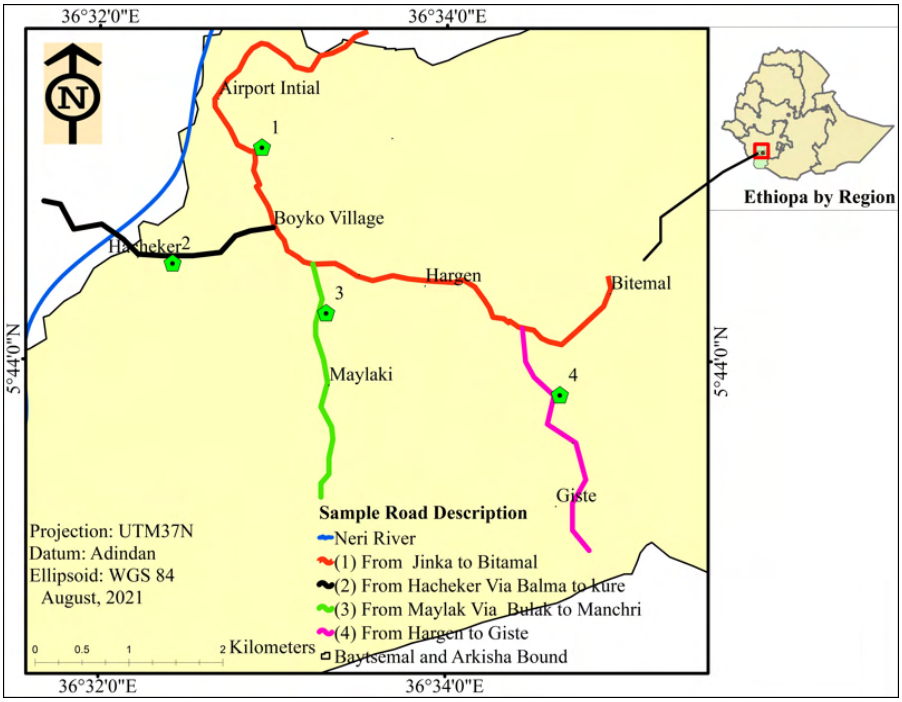
The SATREPS-MNGD project is implemented in Addis Ababa and Jinka, South Omo Zone in the Southern Nations, Nationalities and Peoples' Region (SNNPR) of Ethiopia. While much of the laboratory analyses have been conducted at AASTU in Addis Ababa (the capital of Ethiopia), the social studies have been undertaken in Baytsimal and Kaysa Kebeles (the lowest administrative tier in Ethiopia) near Jinka Town, the capital of South Omo Zone. The project intends to identify, through laboratory analysis, the physical mechanisms of the expansive soil and develop plant-derived soil additives to improve the stability of unpaved roads. Researchers of AASTU have been working on this in collaboration with the Japanese partners and they regularly update each other on their findings.

Besides, the social science study explores the local contexts that include, among others, the history of road construction and maintenance, the frequency and purpose of road use, the occurrence of road disasters and the causal agents, local agencies responsible for road construction and maintenance, the current state of roads, and the views of local people about the SATREPS-MNGD project. The first phase of the social sciences research was undertaken between 01 July 2021 and 30 September 2021 by employing qualitative research approach. Data were collected from different members of selected

Households through face-to-face interviews and direct observation. Prof. Gebre Yntiso Deko (representing the Japanese team, who could not travel to Jinka due to COVID 19 pandemic) in collaboration with researchers from Jinka University carried out the study in Baytsimal and Kaysa Kebeles. The details of the research team are presented at the end of this summary report on the preliminary findings.

Facts & Figures about Baytsimal Kebele

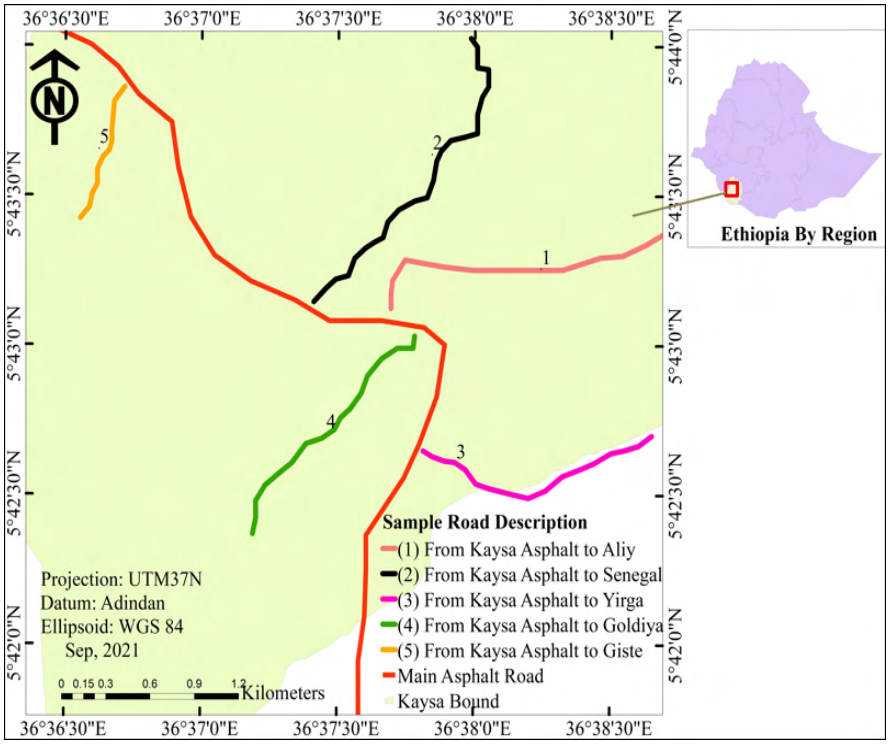
- Situated between latitude and longitude value of 5°44′43′′N to 36°34′47"E
- Population: 6595 (Male 4190, Female 2405)
- Households: 3845, most male-headed, most with large family size
- Economy: Primarily agricultural, also engage in many activities
- Education: Most adults (especially women) are little educated or not educated
- Religion: Most are Proestant Christians and some belong to Orthodox Christianity
- Affiliation: Almost all people belong to various community-based organizations



Map of major roads in Baytsimal

Facts & Figures about Kaysa Kebele

- Situated between 5°44′56′′N latitude to 36°38′10"E longitude
- Population: 7163 (Male 3495, Female 3668)
- Households: 3075, most male-headed, most with large family size
- Economy: Primarily agricultural, also engage in many activities
- Educated: Most adults, especially women, are little educated or not educated
- Religion: Most Proestant Christians + some Orthodox
- Affiliation: Almost all people belong to various community-based organizations



Map of major roads in Kaysa

Types of Roads

In Baytsimal and Kaysa Kebeles, there are three types of roads.

1) Asphalt road that crosses Kaysa, constructed and maintained by the government
2) Earthen roads (1 in each kebele), constructed and maintained by the government
3) Dirt roads (many in each kebele), constructed and maintained by the community

In the two research sites, road disasters are very common, especially during the rainy season. The earthen and dirt raods are severly affected by the disasters, and the common agents are water logging, soil erosion, and landside. The asphalt and earthen roads are rarely maintained due to budget constraints to mobilize machinery, material input, and fuel, among others. The dirty roads are especially vulnerable to road disasters because they lack structural strength to withstand erosion, water logging, and landslide. Hence, they are frequently repaired by community-based organizations. In Baytsimal and Kaysa Kebeles 10 roads (5 in each kebele) have been identified as problematic due to the recurrence of road disasters multiple times in a single year.

Road use in Baytsimal Kebele

Road	**Frequency of Road Use**	**Purpose of Road Use**	**Means of Transport**	Road Condition
Baytsimal-Jinka earthen road	Very frequently	To go to school, business site, market place, health center, shop, family home, and recreation	Motorbike, bajaj, donkey cart, foot, rarely vehicles	Good
Hargen-Bitemal dirt road	Frequently (in dry season)	To go to health center and Woreda offices	Walking, motorbike	Very bad
Maylak-Manchri dirt road	Frequently (during farming season)	To go to agricultural fields, grazing areas, and temporary shelter	Walking	Very bad
Hacheker-Balma dirt road	Frequently (during farming season)	To go to agricultural fields, grazing areas	Walking (Neri River acts as obstacle)	Very bad
Hargen-Gista dirt road	Less frequently	To visit relatives and friends	Walking	Very bad

Note: The Baytsimal-Jinka road is expected to be maintained by the government, as it requires and machinery, fuel and select materials, which the local community cannot afford. Likewise, the government is expected to construct the Baytsimal-Gista road in the near future. However, there is no government plan to maintain the other three roads (Hargen-Bitemal, Maylak-Manchri, and Hacheker-Balma), which are in bad shape and require regular maintenance. The community will continue to maintain those roads.

Road Use in Kaysa Kebele

Road	Frequency of Road Use	Purpose of Road Use	Means of Transport	Road Condition
Kaysa-Ally unpaved road	Very frequently	To go to school, market, church, shop, relatives	Motorbike, walking, sometimes Vehicles	Very bad
Kaysa-Yirga dirt road	Frequently	To go to School, market, health, etc.	Walking, motorbike	Good
Kaysa-Gitsa dirt road	Frequently	To go to agri. fields, grazing areas, relatives	Walking	Very bad
Kaysa-Goldia dirt road	Frequently	To go to agri. fields, grazing areas, relatives	Walking	Very bad
Kaysa-Senegal dirt road	Less Frequently	To go to market, relatives	Walking	Very bad

Note: The government is expected to maintain the Kaysa-Ally unpaved road because it requires machinery, fuel, and other expensive inputs. It is not clear when this road will be maintained. But there is no government plan to maintain the other four roads. Hence, the community will continue to repair them whenever road disasters occur.

Local views about SATREPS-MNGD Project

Informants in Kaysa knew little about the SATREPS-MNGD project. However, the residents of Baytsimal are familiar with the project. Many people have positive views, and hope that the project will be beneficial to their community in terms of addressing road disasters. Knowledge about the project has been enhanced by the involvement of the Japanese partners in the construction of 150 m experimental road to the Baytsimal Primary School using earth-bag, employing the *do-nou* technology. *Do-nou* technology is a Japanese technique of soil reinforcement, which involves the use of bags filled with sand, soil or gravel. It is an inexpensive method for rural road construction or maintenance.

Informants in Baytsimal and Kaysa kebeles expressed interest in the SATREPS-MNGD project and offered to participate through labor contributions on voluntary basis. The positive reaction to the project can be explained in terms of the hope that the project will solve the common problem of road disasters. During the fieldwork, many informants actually inquired whether the project would help the people of Baytsimal and Kaysa in constructing and/or maintaining highly needed or priority roads using the *do-nou* technology. The experimental 150 m road maintenance at Baytsimal Kebele proved successful and won the trust of people, who are now demanding for more similar intervention.

While working on the SARTEPS-MNGD project (exploring ways to improve road stability by applying soil additives from plants), it is important to employ the proven and accepted *do-nou* technology side-by-side for three reasons. First, addressing some of the current practical road problems of the people would serve as inceptive for the participation of the local people in the SATREPS-MNGD project. Second, in case the project totally fails to produce the expected result for different reasons, the proven *do-nou* technology may be promoted as an alternative approach - a fallback backup strategy that enables the project to leave some imprints behind. Third, even if the laboratory experiments lead to promising breakthrough, translating the scientific knowledge into practical application will take several years or even decades depending on the maturity period of the plants, the regularity of supply, etc. The *do-nou* technology can be used as an interim solution in terms of addressing pressing problems.

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