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Land Cover Mapping in West Africa: A Collaborative Process

Foster Mensah [1,*], Fatima Mushtaq [2], Paul Bartel [3], Jacob Abramowitz [4,5], Emil Cherrington [4,5], Mansour Mahamane [6], Bako Mamane [6], Amadou Moctar Dieye [7], Patrice Sanou [8], Glory Enaruvbe [9] and Ndeye Fatou Mar [10]

1 Center for Remote Sensing and Geographic Information Services (CERSGIS), University of Ghana, Legon, Accra PMB L17, Ghana
2 Food and Agriculture Organization of the United Nations (FAO), Viale delle Terme di Caracalla, 00153 Rome, Italy; fatima.mushtaq@fao.org
3 SERVIR West Africa, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Cantonments, Accra PMB CT 112, Ghana; paul.bartel@icrisat.org
4 Earth System Science Center, The University of Alabama in Huntsville, Huntsville, AL 35805, USA; jca0030@uah.edu (J.A.); eac0021@uah.edu (E.C.)
5 NASA SERVIR Science Coordination Office, Marshall Space Flight Centre, Earth Science Branch, Huntsville, AL 35805, USA
6 CILSS/AGRHYMET Regional Center, 425 Boulevard de l'Université, Niamey BP 11011, Niger; mansour.mahamane@cilss.int (M.M.); mamane.bako@cilss.int (B.M.)
7 Centre de Suivie Ecologique, Rue Leon Gontran Damas, Fann Residence Dakar, Dakar BP 15532, Senegal; dieye@cse.sn
8 Higher Institute of Space Studies and Telecommunications (ISESTEL), Parcelle 13, Secteur 21, Arrondissement 5-Dassasgho, Ouagadougou 03 BP 7021, Burkina Faso; patrice.sanou@isestel.org
9 African Regional Institute for Geospatial Information Science and Technology (AFRIGIST), Off Road 1, Obafemi Awolowo University Campus, Ife Central, Ile Ife PMB 5545, Nigeria; enaruvbe@afrigist.org
10 Observatoire du Sahara et du Sahel (OSS), Boulevard du Leader Yasser Arafat BP 31 Tunis Carthage, Tunis 1080, Tunisia; fatou.mar@oss.org.tn
* Correspondence: fmensah@ug.edu.gh

Abstract: The availability of current land cover and land use (LCLU) information for monitoring the status of land resources has considerable value in ensuring sustainable land use planning and development. Similarly, the need to provide updated information on the extent of LCLU change in West Africa has become apparent, given the increasing demand for land resources driven by rapid population growth. Over the past decade, multiple projects have been undertaken to produce regional and national land cover maps. However, using different classification systems and legends has made updating and sharing land cover information challenging. This has resulted in the inefficient use of human and financial resources. The development of the Land Cover Meta Language (LCML) based on International Organization for Standardization (ISO) standards offers an opportunity to create a standardized classification system. This system would enable easier integration of regional and national data, efficient management of information, and better resource utilization in West Africa. This article emphasizes the process and the need for multistakeholder collaboration in developing a standardized land cover classification system for West Africa, which is currently nonexistent. It presents the survey data collected to evaluate historical, current, and future land cover mapping projects in the region and provides relevant use cases as examples for operationalizing a standardized land cover classification legend for West Africa.

Keywords: land cover classification; data harmonization; semantic interoperability; land cover meta language; West Africa; geospatial

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1. Introduction

1.1. The Relevance of a Land Cover Harmonization Framework for West Africa

Accurate and up-to-date information on land cover and land use (LCLU) is crucial for tracking land-based indicators of the Sustainable Development Goals (SDGs). Thus,

the United Nations recognizes land cover information as a fundamental geospatial data theme layer [1]. The African Union (AU) Agenda 2063 envisions productive agriculture and healthy ecosystems in a continent resilient to climate change [2]. Similarly, the Economic Community of West African States (ECOWAS) Regional Environmental Action Plan (EAP), adopted in 2008 and revised in 2020, seeks to "reverse trends of natural resource degradation and depletion to guarantee to the people of the sub-region, a healthy environment that consequently improves on the living conditions of the population" [3]. The EAP highlights the presence of "ineffective collaboration, linkages and coordination among institutions of environmental management" and calls for the "minimization of duplications, to ensure synergy and coherence amongst the various actors". These noble ideas and objectives require a common semantic framework for land cover assessment, the dynamics of its use, and impacts on land, agriculture, forests, and water resources. However, land cover maps of West Africa are based on different land cover classification systems and methodologies. Additionally, there is a lack of documentation, and in cases where attempts are made to characterize land features, class descriptions are not provided or unclear where provided. Sometimes, different terminologies are used for the same concept, and, sometimes, the same terminologies are used for heterogenous concepts. This limits the usability and integration of different land cover datasets at the regional or even national levels.

Due to the unavailability of up-to-date land cover and land use information, global datasets are used for regional and national land change assessment and impact studies. Therefore, there is an urgent need for a regional semantic interoperability framework that incorporates different map scales and production objectives and unambiguously defines land cover classes using internationally accepted standards. The development of a Land Cover Meta Language (LCML) by the Food and Agriculture Organization of the United Nations (FAO) based on the International Organization for Standardization (ISO) standards offers an opportunity to create a standardized classification system. Also, the development and adoption of a West African Land Cover Reference System (WALCRS) would enable easier integration of regional and national data, efficient management of information, and better resource utilization in West Africa. Land cover legends compatible with the International Organization for Standardization (ISO) international nomenclature would facilitate map comparability, accuracy assessment, and area estimates of land cover classes. An ontology-based semantic mapping approach for integrating land-cover products has been effectively demonstrated by Zhu et al. [4]. Thus, the semantic similarity between heterogeneous land-cover products can be achieved by combining land cover attributes for real-time land-cover mapping for the subregion. Kinoshita et al. [5] implemented an approach using ground truth data to integrate global land cover maps. They used the same legend as the ground truth data to create a lookup and achieved a higher accuracy than the existing maps. The corresponding probability map showed the probabilities of the chosen land cover categories. In their case study of conterminous United States, Zhu et al. [6] proposed an integration method based on fuzzy theory and combined three land cover datasets, namely the National Land Cover Database 2011, Fine Resolution Observation and Monitoring of Global Land Cover Segmentation 2010 [7], and the global forest cover data (treecover 2010) [8,9], using the European Environment Information and Observation Network Action Group on Land Monitoring in the European (EAGLE) system of semantic translation [10]. These existing land cover datasets were integrated to improve the GlobeLand30 [11] forest class data to obtain second-level classification, i.e., broadleaf, coniferous, and mixed forest classes over the coterminous United States. They showed that land cover product accuracy can be improved by effectively integrating multiple land cover datasets. This example indicates that, while the inconsistency between the source data and the target data classification system can be addressed, the accuracy of each source data can also be efficiently improved. Invariably, the classification scheme of each land cover map is inconsistent with others because of the variations in legend definitions. While a land cover classification scheme is essential for land cover mapping [12–14], several of these classification schemes are significantly different in class names, class definitions,

level of detail, and compatibility. However, many studies have directly compared and transformed land cover legends during integration. The different classification legends used by West African countries for mapping land cover present an opportunity for a standardized classification system that facilitates semantic interoperability. While this article does not discuss the land cover integration process per se, it points out the unique characteristics of the West African Classification Reference System (WALCRS).

The objective of this article is to emphasize the process and the need for multistakeholder collaboration in developing a standardized land cover classification system for West Africa and presents the data collection methodology for evaluating historical, current, and future land cover mapping projects in the region and provides relevant use cases as examples for operationalizing a standardized land cover classification legend for West Africa. The goal is to facilitate collaboration among diverse stakeholders in West Africa, including development, regional and national agencies, environmental organizations, and domain experts, to create a standardized land cover legend for the sub-region.

1.2. Regional and National Land Cover Mapping Initiatives in West Africa

Given the unprecedented land cover change in recent decades, West Africa has attracted the attention of project initiatives seeking to strengthen the capacities of regional and national institutions to produce current LCLU-related datasets for monitoring land change and vegetation-based indicators. Within the scope of the ESA-GlobCover 2005 project, the 300 m global land cover map for 2005 was updated in 2010 by the European Space Agency (ESA) in partnership with the Joint Research Centre (JRC), European Environment Agency (EEA), Food and Agriculture Organization (FAO), United Nations Environment Programme (UNEP), Global Observation for Forest Cover and Land Dynamics (GOFC-GOLD) and International Geosphere-Biosphere Programme (IGBP) to produce a land cover map at the scale of all of Africa [15] based on the FAO land cover classification system (LCCS). In 2016, the Agrometeorology, Hydrology, and Meteorology Regional Center (AGRHYMET) collaborated with the United States Geological Survey (USGS) to jointly publish an atlas of West Africa's land cover [16]. The atlas utilized National Aeronautics and Space Administration (NASA) and USGS Landsat imagery to classify the region's land cover patterns for 1975, 2000, and 2013 and was updated using AGRHYMET to 2018 (Figure 1). The Sahara and Sahel Observatory (OSS) has also developed land cover maps for North and West Africa based on data from Sentinel-2 satellites [17]. Likewise, the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) has supported the development of LULC maps at both regional [18], national [19], and subnational [20] scales. In its second Research and Action Plan (WRAP 2.0), WASCAL is supporting high-resolution LULC mapping through two projects, namely "greenhouse gas (GHG) emissions and mitigation options under climate and land use change in West Africa concerted regional modeling and assessment (CONCERT WEST AFRICA)" and "land surface processes as a determinant of climate change in Africa—scenarios, high-resolution modeling and development of a stakeholder data portal (LANDSURF)" [21]. NASA's SERVIR applied science teams have recently supported future land use scenario development projects and the integration of time series Earth observation (EO) data for land use planning [22,23]. They are currently developing workflows for near real-time monitoring of forest disturbance in West Africa, as well as integration of socioeconomic and EO data to characterize conflict precursors and land degradation dynamics in Ghana. The diversity of land cover mapping projects without a harmonized classification system necessitated the creation of the West Africa Land Cover Task Force (WALC-TF) to develop collaborative initiatives for land cover mapping and monitoring and ensured the harmonization of disparate legends in West Africa.

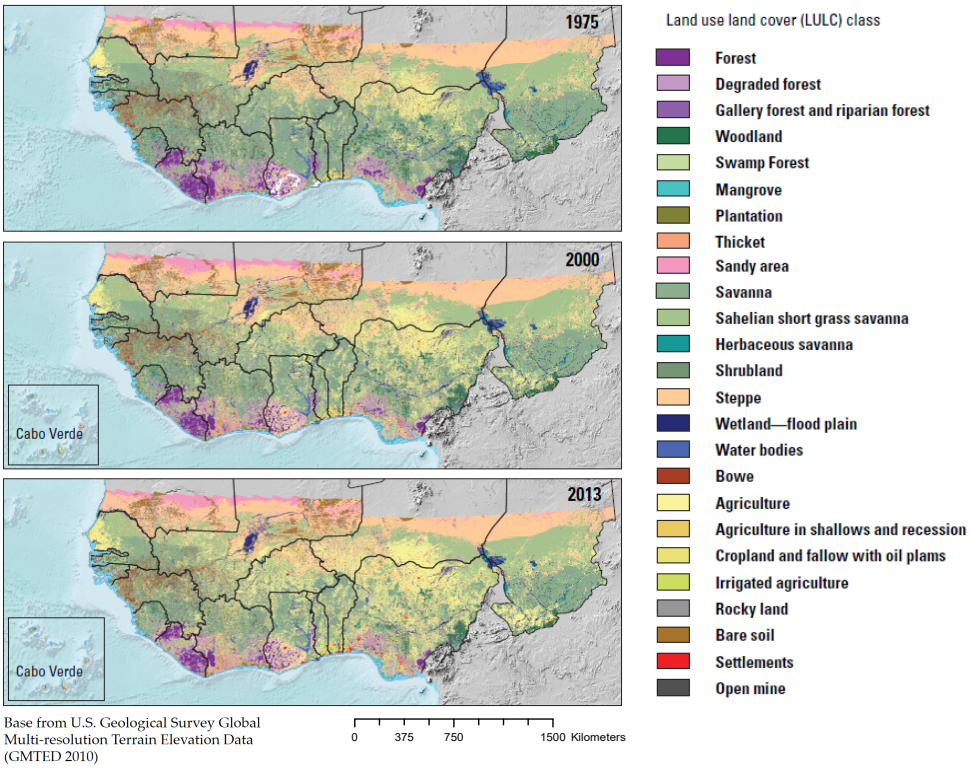

Figure 1. The West Africa land use and land cover time series maps, jointly produced by USGS and AGRHYMET.

1.3. The West Africa Land Cover Task Force

In June 2018, under the auspices of ECOWAS, SERVIR West Africa hosted a regional conference on land cover classification and methodologies in Accra, Ghana, to engage regional and international experts on the harmonization of land cover classification systems and methods used in the subregion. Following the conference, an inter-agency multistakeholder group, the WALC-TF, was established to address the conference recommendations: harmonizing land cover products across the region and developing standards for describing product accuracy compatibility with international standards. The task force was also mandated to coordinate and facilitate access to suitable capacity development programs for regional researchers, practitioners, and policymakers. The task force consists of members from the SERVIR-West Africa consortium, namely the Agrometeorology, Hydrology, Meteorology Regional Center (AGRHYMET), the African Regional Institute for Geospatial Information Science and Technology (AFRIGIST), the Centre de Suivi Écologique, (CSE) in Senegal, the Centre for Remote Sensing and Geographic Information Services (CERSGIS) in Ghana, and the Higher Institute of Space Studies and Telecommunications (ISESTEL) in Burkina Faso. Other international institutions outside of the SERVIR West Africa consortium include the West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), the Sahel-Saharan Observatory (OSS), the Global Observation of Forest Cover and Land Dynamics-West Africa Regional Network (GOFC/GOLD-WARN), the Joint Research Center of the European Commission (JRC), and the Food and Agriculture Organization of the United Nations (FAO) [24].

2. Study Area

West Africa is a heterogeneous and rapidly developing subregion that has experienced significant socioeconomic and biophysical changes over the past decades [25]. This rapid transformation of West African landscapes can be described as anthropogenic, given the extensive exploitation of natural resources and the rapid modification of land cover [25,26]. The subregion, which is about 8 million square kilometers, can be classified broadly into

five ecological zones, based on climate and vegetation characteristics, from the humid southern coast to the Sahara as Guineo-Congolian, Guinean, Sudanian, Sahelian, and Saharan (Figure 2). The Sudanian zone is dominated by vegetation, which ranges from open tree savannah to wooded savannah and open woodland. The grassland is often taller than in the Sahel region. The vegetation in the Guinean region is dominated by wet-and-dry deciduous or semi-deciduous forests with dense and closed forest canopy, which often forms an understory with very high trees. The vegetation in the Guineo-Congolian region is rich and dense forest, with trees reaching over 60 m with intermingling crowns. The biodiversity in this zone is considered relatively rich [27]. Although smallholder crop cultivation is the dominant land use in the region, land cover types and land use systems vary across the different ecological zones. Various land cover legends have therefore been designed and implemented, such as Yangambi [28], FAO-Land Cover Classification System (LCCS) [29], Intergovernmental Panel on Climate Change (IPCC) land cover classification scheme [30], and various national forest classification systems for specific ecological zones with multiresolution satellite data.

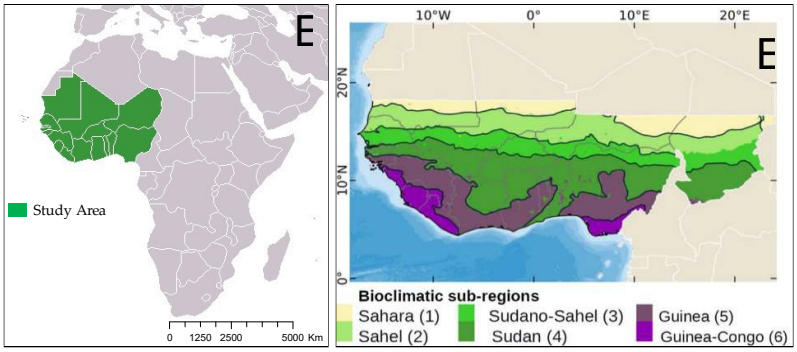

Figure 2. The study area and bioclimatic zones.

3. Methodology

As part of the land cover data harmonization process, regional consultations were organized to strengthen the collaboration among national, regional, and international stakeholders and prepared for developing the regional reference system for the subregion. The system development also involved a literature review and understanding of various land cover systems used in the region to identify areas where harmonization is required for interoperability. Data inventory survey and stakeholder engagement were critical in setting a framework for the West African Land Cover Reference System (WALCRS). Additionally, the role of subject matter experts from the FAO was instrumental in creating the relevant building blocks for the reference system.

The survey was conducted to collect the existing land cover datasets, land cover legends, land cover class definitions, and relevant documentation in the subregion. Experts from academia and the public sector from national and regional organizations responded to the invitation to participate in the survey. The survey questionnaire in support of the regional land cover harmonization process was prepared in collaboration with the WALC-TF to evaluate the inconsistency and noninteroperability between land cover map legends. The questionnaire was shared with 229 potential respondents across

West Africa from institutions working in the environment and forestry sectors, tertiary institutions, and research centers. The questionnaire was administered with Google Form to relevant partner institutions in the 17 member countries of ECOWAS. The questionnaire was administered in English and French, the two main languages in West Africa. While contact persons were not physically interviewed, the online inventory fostered initial engagement with institutional partners for the collaborative process of developing a regional semantic framework for mapping land cover. The questionnaire was categorized into sections to collect data on respondents' contribution to any land use/cover mapping activities in West Africa, the use of FAO's Land Cover Classification System (LCCS), country-level land cover

datasets (i.e., date of production, the institution responsible for the data production, access to the data, and contact address), and corresponding legends if available.

4. Results

Out of representatives in the 17 countries contacted, respondents from 11 answered the questionnaire, giving a country-level response rate of 65%. A total of 116 land cover datasets and 33 land cover legends were collected through a survey (Figure 3).

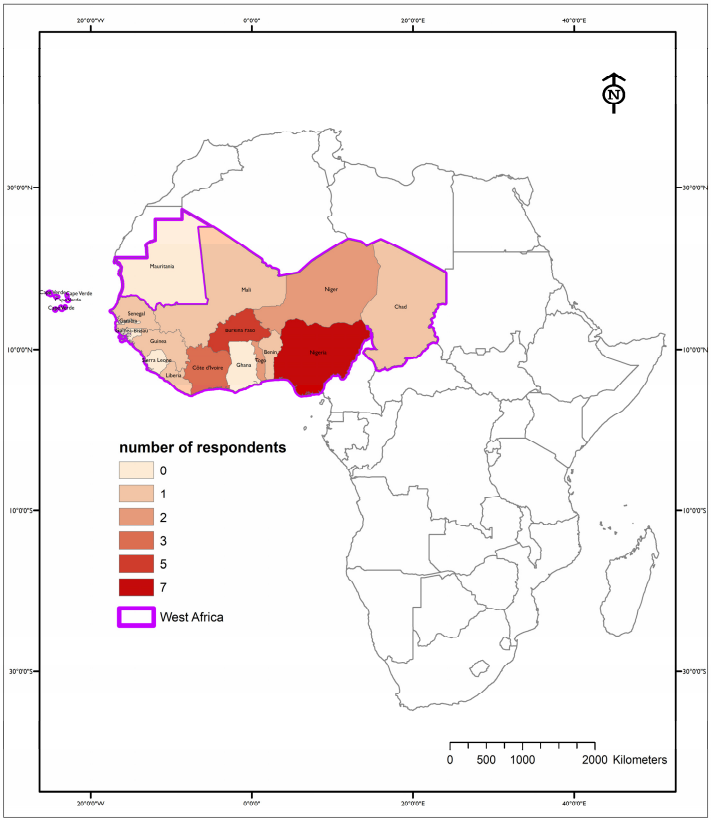

Figure 3. Number of responses received from the 17 West African countries.

The survey showed that most respondents in the subregion have been involved in land use and land cover activities, but fewer than 50% have used the FAO land cover classification system (LCCS) [24]. While land use and land cover datasets are available and accessible, the corresponding legends are not, making the maps compliant with international standards. As a result, the West African Land Cover Reference System will help establish a standard naming system for regional and national land cover classification schemes based on international ISO standards to address this issue. The land cover reference system will provide an unambiguous ordering of the land features by eliminating inconsistencies in the definition of different land features (Figure 4).

For example, in a tree-dominated area (Figure 5), two classes are expected to be classified as closed-tree formation and open-tree formation, subdivided according to the different cover ranges that characterize the dominant element tree. The closed tree formation will constitute a mandatory stratum that defines the overall class structure as a tree, with attributes such as tree cover expressed as a percentage of tree crown covering the ground (70–100%), tree height, and vegetation naturalness or artificiality, which, in this case, is defined as natural vegetation. Similarly, the open-tree formation will constitute a basic class with one mandatory strata that defines the overall class aspect. However, while its tree cover attribute is expressed in percentages (20–70%), it is still defined as natural vegetation. A further subdivision can be made for both closed- and open-tree formations. At this level, the classes will have structural aspects and other thematic details as necessary.

The reference system is based on an object-oriented land cover meta language (LCML). The LCML provides a set of ISO standard elements for land features that can be enriched with different attributes to describe complex semantics of land cover classes in different land cover-related applications. The LCML objects are represented with unified modeling language (UML) (Figure 6), which makes it easier to describe real-world characteristics and is straightforward to use in a GIS modeling environment to generate consistent dynamic land cover datasets [31].

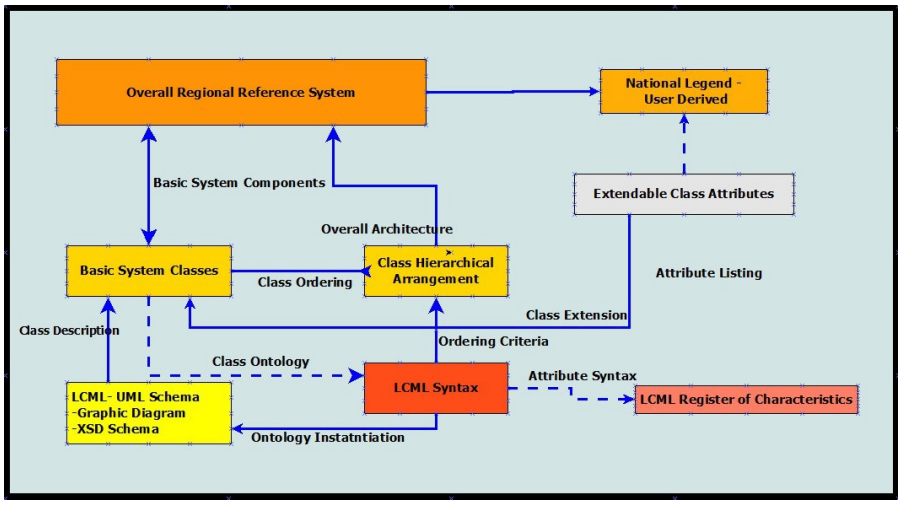

Figure 4. Regional reference system components and their functional relationships [32].

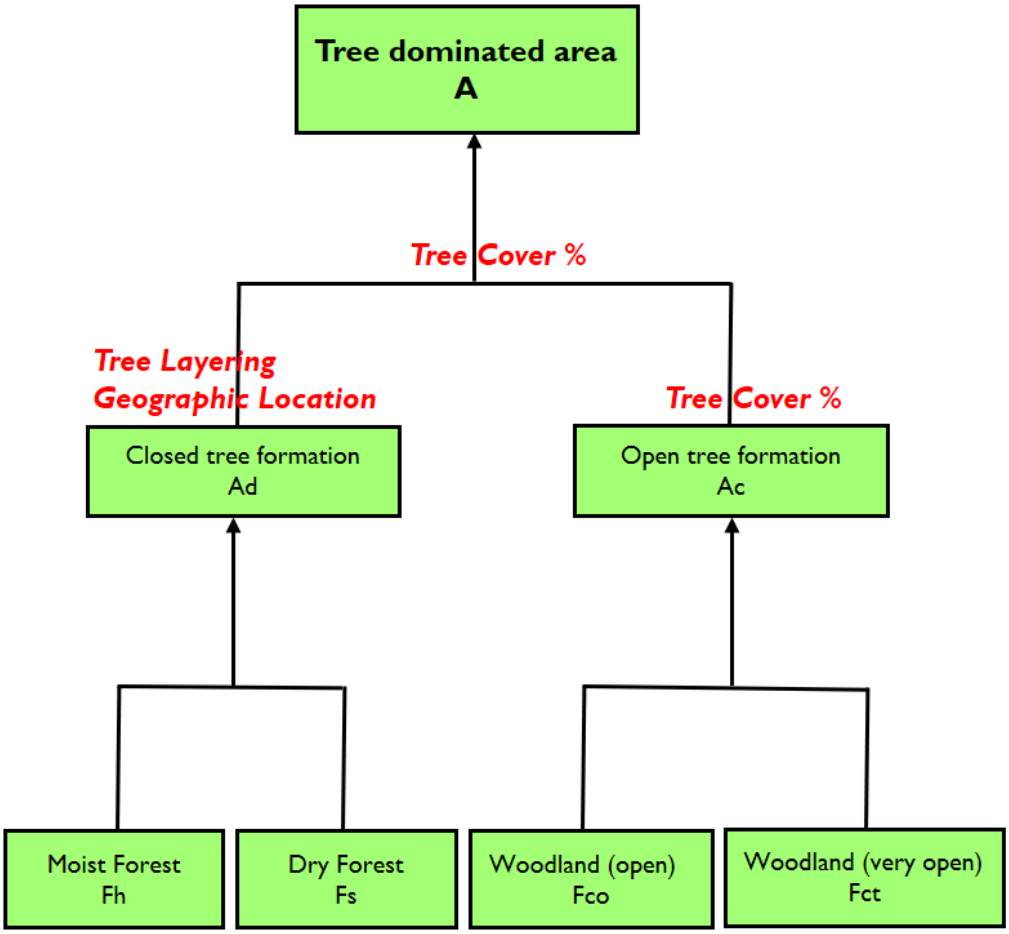

Figure 5. Structure of tree-dominated areas [31].

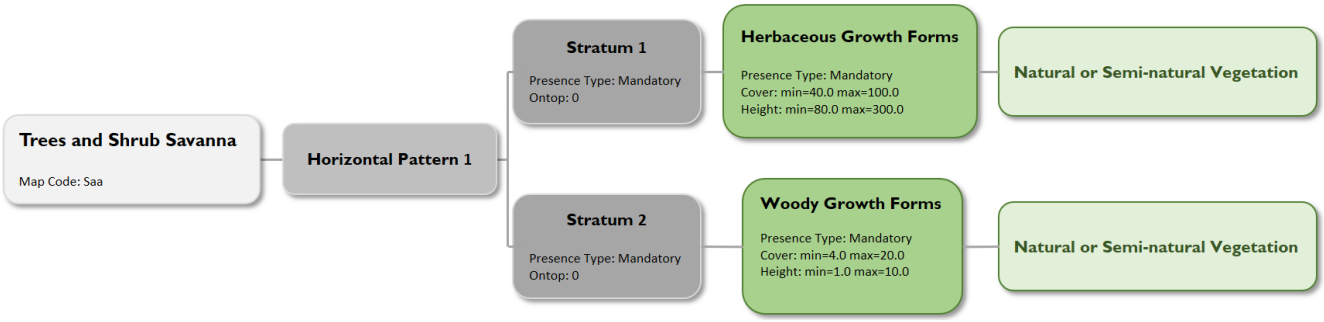

Figure 6. UML diagram representing the description of a land cover class for trees and shrubs [31].

The system is dynamic in terms of organizing land features at many levels and the corresponding land cover legend. Furthermore, the land cover meta language provides a dictionary of attributes depicted in the graphical model (gray boxes) in Figure 7. The result is an ISO-based land cover dataset generated with LCML-based land characterization software [32,33]. The land characterization system software provides tools to characterize land cover with predefined elements like trees, shrubs, herbs, buildings, and others that can be combined to represent real-world features.

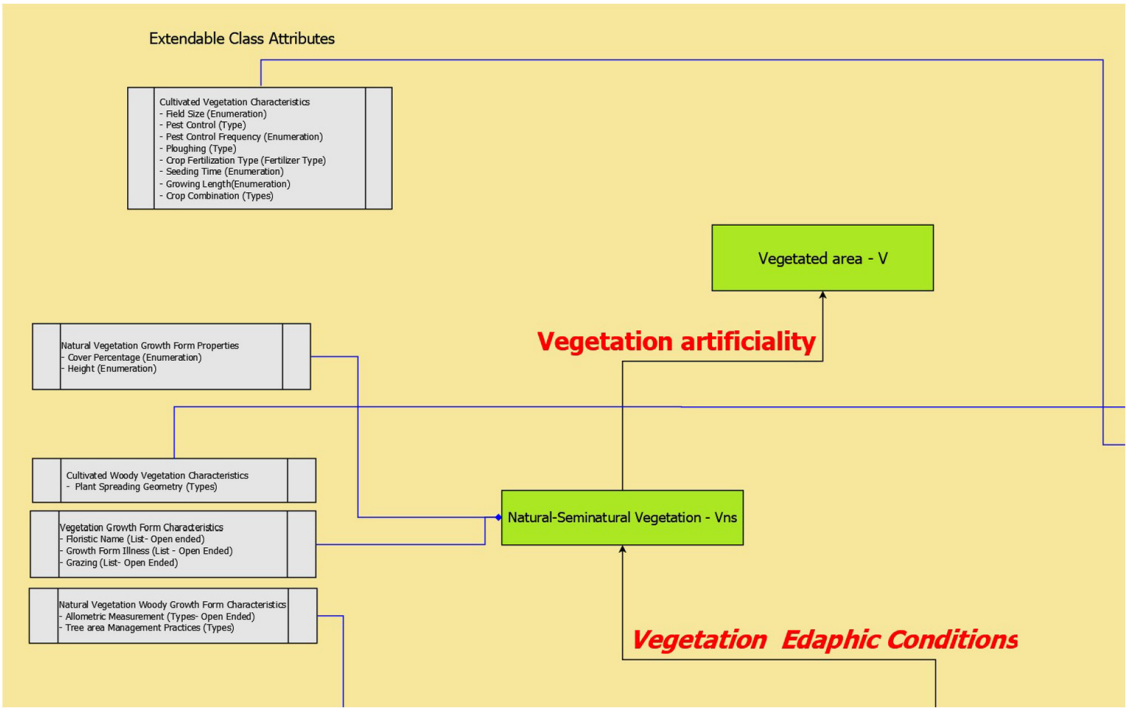

Figure 7. An illustration of the land cover meta language attributes [31].

5. Use Cases

The use cases presented in this section are land cover-related products generated by regional and national West African organizations working together to establish a standardized land cover legend for West Africa. They were provided to highlight existing land cover-related products created in the sub region for different purposes that could be used as examples to operationalize the West African Land Cover Reference System (WALCRS). These examples may also be used to create specialized legends for pilot projects on watershed management, ecosystem restoration, biodiversity conservation, and forest carbon stock assessment at national and regional levels by following a consistent regional land cover reference system.

5.1. Assessing West Africa's Current Forest Carbon Stock

The SERVIR Carbon Pilot (S-CAP) is an activity implemented by SERVIR to monitor forest carbon in 11 SERVIR pilot countries, including Ghana. The activity is based on Earth observation data and in situ observations to improve GHG emissions monitoring. The S-CAP tool uses an ensemble approach to estimate and visualize carbon emissions based on IPCC Guidelines for National Greenhouse Gas Inventories. The tool focuses on changes in forest cover to estimate changes in above-ground biomass and carbon stock. The initial result highlights the importance of land cover and land cover change data and how forest carbon stock varies significantly depending on the level of land cover change. https://s-cap.servirglobal.net/pilot/8/ (accessed on 27 August 2024).

5.2. Monitoring Artisanal Small-Scale Gold Mining and Climate Change Resilience in Ghana

Ghana is one of the leading producers of gold in Africa and the world [34]. However, about 35 percent of the gold is extracted informally through artisanal mining. Although these informal mining sites cover less area, the negative impacts on land, forest, and freshwater resources outweigh those of large-scale mines. The Center for Remote Sensing and Geographic Information Services (CERSGIS), a consortium member of the SERVIR-West Africa program, has been using freely available satellite-based earth observation data to identify, map, and quantify informal artisanal small-scale mining activities in Ghana. The maps generated by CERSGIS (Figure 8) serve as advocacy and decision-making tools for national and local authorities, enabling them to identify areas that require attention and intervention.

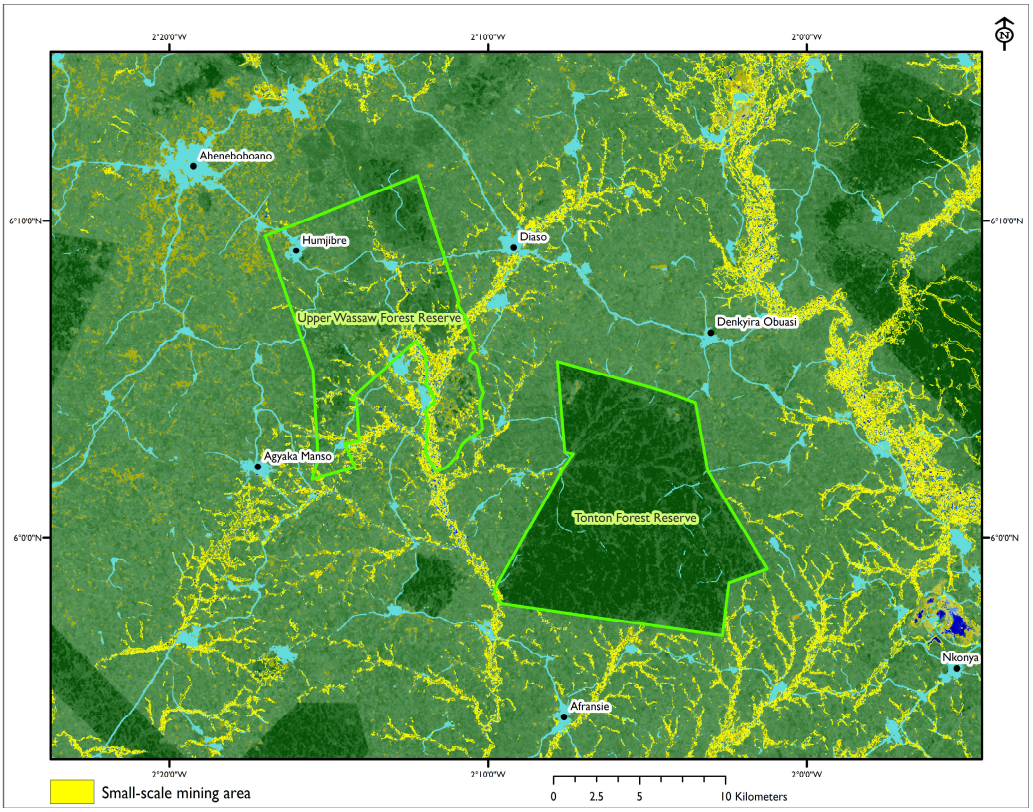

Figure 8. Footprints of small-scale gold mining in the forest zone of Ghana.

Similarly, the Ministry of Environment, Science, Technology and Innovation in Ghana is developing nature-based solutions to enhance the climate-change resilience of infrastructure systems across the transport, water, and energy sectors. In support of this initiative, CERSGIS has provided land cover and land use data to assess the impacts of such infras-

tructure systems on ecosystem services while developing prioritization options for climate change adaptation.

5.3. Mapping Charcoal Production Sites to Assess Ecosystem Degradation in Ghana

Close to 80 percent of African urban households use charcoal as their primary source of cooking fuel [35]. The growing energy needs of the urban population in sub-Saharan Africa pose an increasing pressure on forest resources [35]. While unsustainable charcoal production degrades environmental services, it also contributes to biodiversity loss, wildfires, and poor air quality. In Ghana, suitable tree species for charcoal production are declining in the main charcoal-producing areas, and producers are already harvesting tree species that are less suitable for charcoal production. Thus, The Centre for Remote Sensing and Geographic Information Services (CERSGIS) uses high-resolution earth observation satellite images to map the evolution of charcoal production sites over time and estimates aboveground biomass removals resulting from charcoal production. The maps produced with CERSGIS (Figure 9) are used by national and local authorities to monitor and plan landscape restoration in the target areas.

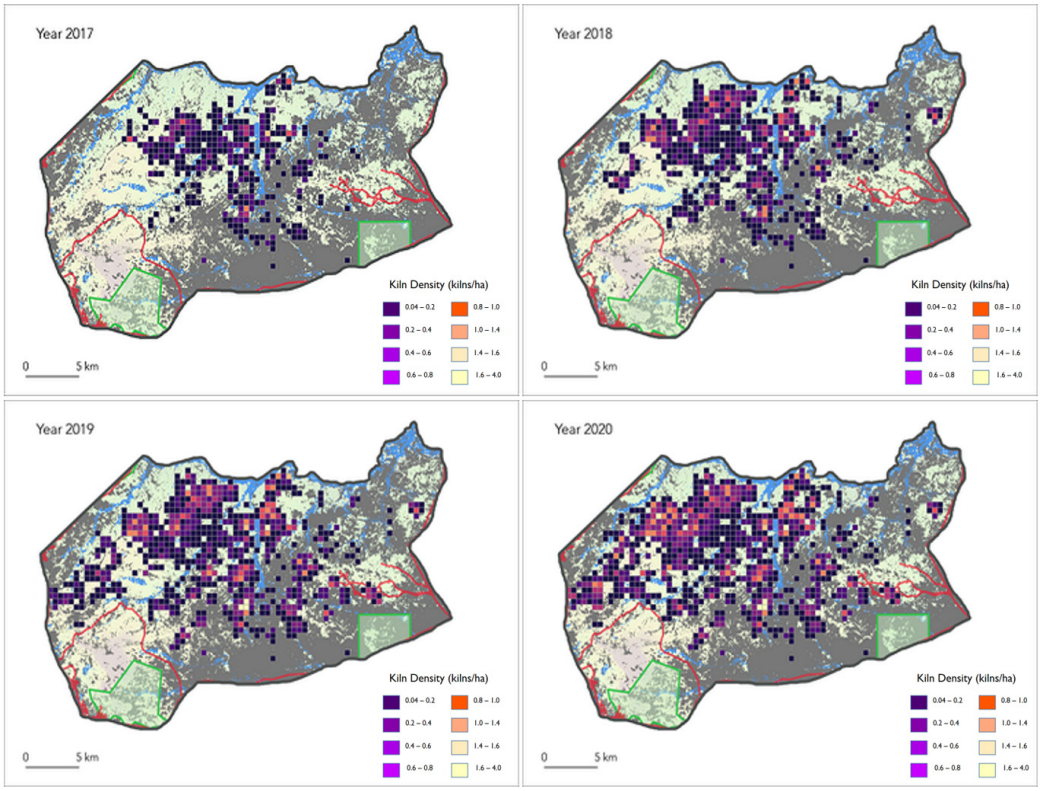

Figure 9. The evolution of charcoal production kiln density in Ghana's Northern Savanna landscape from 2017 to 2020.

5.4. Sustainable Natural Resources Management

The Global Monitoring for Environment and Security and Africa (GMES and Africa) Initiative, funded by the European Union, aims to improve the capacities in Africa to promote the sustainable management of natural resources through the use of Earth observation data. A consortium of institutions in eight West African countries (including Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinee, Mali, Niger, and Senegal), led by the Centre de Suivi Ecologique, Senegal, a member of the SERVIR-West Africa consortium, is implementing a monitoring system for the sustainable management of wetlands to enhance ecosystem resilience in West Africa. The project has developed and disseminated a portfolio of land cover-related products and services to improve decision-making on the sustainable management of wetlands in West Africa. Two wetlands were selected in each focus country

to develop products and services for the benefit of users. The initiative has also built the capacities of site managers to implement sustainable wetland management policies. In addition, the project has developed an observatory (geo-portal, http://gdzhao.gmes.cse.sn (accessed on 27 August 2024)) intended to provide high-quality maps and services, including the identification and delimitation of wetlands, monitoring of surface water dynamics, monitoring of water quality and invasive aquatic vegetation, mangrove inventory, and the mapping and monitoring of wetlands (Figure 10).

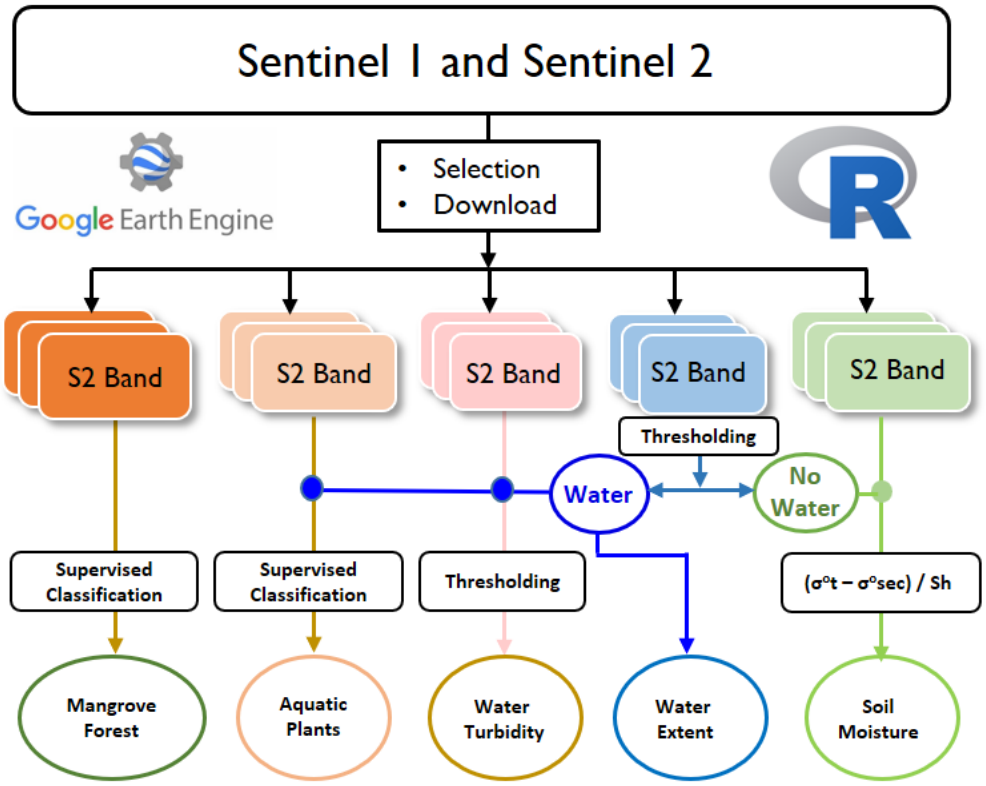

Figure 10. Workflow developed by the GMES and Africa project for production of thematic maps.

6. Discussion

Many land cover mapping institutions in West Africa use different land cover classification systems and legends. Thus, developing a standard legend with clearly defined land cover classes based on ISO standards is essential for international consistency. The ISO-based FAO Land Cover Classification System provides a solid basis for developing a classification system compatible with international standards. Given the diverse ecosystems in the subregion, the standardized system should account for ecosystem variations. This will realistically reflect the different ecological zones and the region's dynamic land cover types. While it is vital that the classification system accommodates varying levels of detail, allowing for local, national, and regional scales will ensure that use cases can be developed at any scale necessary, from land management to policy-making. Land cover in West Africa is mainly influenced by human activities like urbanization, mining, agriculture, and natural resource extraction. Thus, the system must integrate land use types that account for practices like smallholder farming, shifting cultivation, pastoralism, charcoal production, and artisanal and small-scale mineral extraction. This will reflect common land use types in the subregion. Furthermore, the system must include cultural land use classes like sacred groves and communal forests. Sustainable land and water resource management practices aligned with the Sustainable Development Goals (SDGs), especially for monitoring wetlands, soil fertility depletion, deforestation, and land degradation, will make the system adaptable to changing landscapes [36,37]. Integrating machine learning and artificial intelligence tools to improve the automation of workflows and classification

accuracy will be a cost-effective way of processing large datasets. Lastly, cooperation among governments, regional bodies, and research institutions is critical for adoption and sustainability. The system should, therefore, align with land use and environmental policies for decision-making.

6.1. Opportunities

Efforts by the West Africa Land Cover Task Force have been immensely complemented by the FAO's technical assistance through collaborative capacity-building initiatives in partnership with ECOWAS, the permanent interstate Committee for Drought Control in the Sahel (CILSS), Sahara and Sahel Observatory (OSS), and SERVIR West Africa to develop a West African Land Cover Reference System (WALCRS). The reference system holds scientific and developmental significance for the subregion. It represents a step towards establishing a land cover reference system based on ISO Standards. The objectives for land cover mapping in West Africa are diverse. They include agricultural monitoring, ecosystem service assessment, land use planning, land degradation monitoring, greenhouse gas inventories, climate change mitigation and adaptation assessment, and disaster response. These varying objectives have led to inconsistencies in regional land cover maps. The land cover reference system will simplify the standard classification of land features and the development of standard land cover legends by using the ISO-based Land Characterization System Software (LCHS) developed by FAO [38] to eliminate ambiguities in defining land features and legends. The WALCRS will greatly facilitate regional, national, and local land change monitoring, providing an objective, science-based framework to monitor land cover and land use change in West Africa.

6.2. Strengthening Regional Geospatial Technical Capacities

Land cover mapping professionals have been introduced to the ISO-based land cover legend registry (LCLR) and the Land Characterization System Software (LCHS). Additionally, webinars have been organized for GIS and remote sensing specialists in the subregion to familiarize them with various free and open-source tools such as SEPAL (System for Earth Observation Data Access, Processing and Analysis for Land Monitoring) and Collect Earth Online (CEO). These tools are used to produce current land cover data for natural resource monitoring. SEPAL is an open-source, cloud-based platform that provides users access to extensive archives of free earth observation data. It offers a user-friendly interface for processing and analyzing datasets [39]. Collect Earth Online is a platform for performing sample-based image interpretation through visualization and classification of multiple high-resolution images. It also facilitates the collection of reference observations in satellite image data at sample locations without the need to download satellite images [40]. The collaboration between the FAO and the NASA-SERVIR Applied Science Teams has strengthened capacity-building programs in the subregion. These programs focus on sampling and inference techniques, sampling and response design, sampling-based area estimation, and multicriteria spatial modeling for land use planning. The customized training designed for land and natural resource managers aims to create sufficient and skilled human resources for land cover change monitoring and ecosystem assessment. A significant outcome of this development is the strong collaboration formed by regional and national institutions in the subregion, FAO, and the NASA-SERVIR applied science teams.

6.3. Future Perspective

The next step is operationalizing the West African Land Cover Reference System to provide harmonized, comparable, consistent, and up-to-date land cover datasets for countries in West Africa. While collaboration among regional, national, and international partners like the FAO and NASA-SERVIR applied science teams have been laudable, the critical feature of this process is the engagement with national stakeholders. The Land Characterization System Software (LCHS) will be used for a pilot phase to enhance the technical capacities of national partners in the subregion and to build national platforms

for land cover-related change analysis and ecosystem assessments. Future research should prioritize integrating common land use practices in the sub-region into the Land Cover Reference System. Emphasis should be placed on developing a system adaptable to changing landscapes to address the challenge of climate change.

7. Conclusions

Following the results of the regional consultations and survey conducted on existing land cover datasets and legends in the subregion, it is essential to make the land cover maps produced for West Africa ISO-compliant in order to compare global, regional, and national land cover and land use (LCLU) map products. The process of harmonizing land cover will require ongoing engagement among regional experts to ensure a unified approach. Collaborating with the Food and Agriculture Organization (FAO) and the NASA-SERVIR applied science teams is a significant step in supporting the Economic Community of West African States (ECOWAS) through its Commission of Agriculture, Environment, and Water Resources to promote a broader understanding and utilization of land cover and land use data by national member states. This will help ECOWAS member states meet international reporting requirements on time. The SERVIR West Africa Land Cover Task Force, together with its international partners, has demonstrated the importance of synergies and collaborative approaches in developing a standardized land cover classification system and legend for West Africa.

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