

## Article

# Towards Legislation Responsive to Integrated Watershed Management Approaches and Land Tenure

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**Abstract:** Land tenure affects integrated watershed management approaches in various ways, such as influencing land use and investment in sustainability practices and decisions. However, some land tenure and integrated watershed management relations need more examination, including how the prevailing relevant legislation responds and the needed course of action. In this paper, we provide relevant evidence to support a shift to responsive actions and legislation through (a) examining land tenure scenarios affecting integrated watershed management, including the public–private land tenure co-existence from a watershed perspective; (b) the responsiveness of the prevailing relevant legislation to integrated watershed management and the land tenure scenarios and (c) identifying legislative remedies recommendable for responsiveness. We use qualitative methods to review secondary data sources, including four legislations, and complement them with field survey data. Field experiences are from three sub-catchments in the Lake Victoria basin, each representing a different land tenure system, as case studies. Land tenure links with integrated watershed management in various ways, such as influencing land use decisions. However, underscoring the relationship from the private and public land tenure perspective also indicates a complex and tense spatial relationship. As such, it likely limits adopting sustainable land use and management practices in watersheds as a case. Regardless, the perceptions from the study area indicate the land tenure systems and forms enabling sustainable choices and decisions, despite limitations such as tenure insecurity. The disconnect between integrated watershed management aspirations of ensuring sustainability, the land tenure abilities and the subsequent human practices is mainly institutional, with the relevant legislation indicating a low to moderate level of responsiveness to integrated watershed management approaches and land tenure, thus, abating effectiveness. Therefore, we suggest a shift towards responsive programming and legislation and the adoption of model legislation to support responsiveness replication. We also recommend further studies to assess the legal gaps and feasibility thereof.

**Keywords:** legislation; environmental law; holistic; land rights; catchments; private; property rights



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## 1. Introduction

Responding to nature-human needs and relationships in an integrated and sustainable way has gained momentum since the 1992 Rio de Janeiro Conference on Environment and Development [1]. Integrated watershed management, in this paper, refers to a process and act of holistically managing the environment in a given delineated spatial unit, considering both upstream and downstream systems connectivity, for social and ecological systems sustainability. Integrated watershed management incorporates several implementation approaches, including integrated water resources management (IWRM). At least 186 member states of the United Nations have subscribed to some form of integrated watershed management approach and land tenure issues through Sustainable Development Goals 6.5 and 1, mainly. Despite the wide adoption of integrated watershed management approaches, approximately 58% of the member countries, most of which are in the global south, need to be on track to achieving integration and its aspirations based on the targets set out in the sustainable development goals framework [2]. The objective of integrated watershed

management approaches includes controlling land use and cover changes, erosion control, improve water and other resources governance, facilitate carbon storage and ameliorate the weak sustainability of measures, among others [3–6]. There are multiple limitations to implementing integrated watershed management, especially the land tenure factor at the catchment level and the legislation factor at the ‘integration’ process level [7–9]. Despite the challenge of implementing integrated watershed management, institutions and land tenure systems are still changing to afford sustainable development [10–13].

Land tenure is a crucial factor observed to influence variations in landscape structure [14], including land use and land cover change, the adoption of sustainable land practices, and investment and conservation decisions [15–18], among other roles we compiled in a review article linking land tenure and integrated watershed management [7]. Attention to the prevailing land tenure systems increases because land tenure refers to a defined relation between individuals or groups with the land, customarily or legally, people’s rights, restrictions, and responsibilities on the land (and property) [19,20]. As such, the human influence, especially the private tenure influence on the land use decision, drivers and thus, resultant land cover change is increasing [21]. A land supply constraint challenges human and ecosystem needs, constraints adaption and mitigation actions to climate and hydrological changes, and fails to achieve integration [2,22–25].

While the land tenure factor is prominent during catchment-level actions, an enabling environment characterized by institutional and legal frameworks is one of the tenants to effect integrated watershed management approaches actions [9,26,27]. The approaches continuously depend on a collection of fragmented sectoral legislation and conventional institutional and normally sectoral legislation frameworks [26,28–31]. As such, the dependence on these primarily public environmental laws encounters weaknesses, such as the complexity of supervising, enforcing, and dealing with diffuse issues and rights [32]. Notwithstanding, environmental legislation has been historically depending on the changes around public values, private rights, and the possible limits envisioned for resources, such as water, thus, the possibility of reforms [33].

Against this background, this paper examines some of the land tenure and integrated watershed management scenarios and the legislative responsiveness as a process to inform reforms. Notably, we answer three questions relating to; (a) what are the land tenure scenarios affecting integrated watershed management? Which scenarios are less understood but essential? (b) How responsive is the prevailing and relevant legislation to integrated watershed management and the land tenure scenario?; (c) What legislative remedies are recommendable for responsive legislation? The research focus presumes to ameliorate limitations to integrated approaches’ effectiveness through integrated watershed approaches and land tenure responsive legislation. We draw a case study area from the global South, exemplarily from the Lake Victoria Basin, as it offers comparative land tenure systems- at a watershed scale, reports of integrated watershed management applications with successes and pending challenges, and a legislative framework with legislation due for reformation.

Our approach to the research questions is two-fold, but they are interconnected. The first part of the paper consists of literature in Section 2. The literature surveys integrated watershed management approaches, their relationship with land tenure and implementation framework in the context of legislation. As a result, additional knowledge gaps in integrated watershed management are identified, such as the co-existence of private and public land tenures in catchments. In addition, we generate field-based observations relating to land tenure and integrated watershed management scenarios, mainly synthesizing the relationship between private and public land resources tenure co-existence and sharing the results in Sections 4.1–4.3, 4.3.1 and 4.3.2. In the second part, we assess the responsiveness of the prevailing relevant legislation to integrated watershed management approaches amidst the land tenure dynamic in Sections 4.4 and 4.4.1–4.4.4 and utilize the findings, to suggest responsive mode legislation in Section 4.5.

## 2. State of the Literature

### 2.1. The Concept and Progress of Integrated Watershed Management Approaches

Managing human relations and nature in a coordinated way dates to 2000 BC, following an appreciation of environmental interconnectedness. The approach further appreciated the role of water and related processes in shaping many other processes in a given setting, thus, the watershed case [34–36]. Along the times, the role of humans gained attention in the watershed management processes, and so did the need to consider every other issue likely to affect the intended outcomes [37]. One of the main reasons for integrating approaches involves building the capability to manage resources such as water and land in a cross-cutting way to meet different demands and ensure environmental sustainability [2]. Other reasons include imparting a way of thinking shaped by multidisciplinary information for application [38,39], as a joint consideration of interacting, yet sometimes distinct, issues to achieve balanced health [29,40,41], or mostly a coordinated process to resource management and development [42]. Furthermore, the integrated approaches continue to relate to a specific space and time in the context of both the natural and human systems [43].

Integrated watershed management approaches can ameliorate the likely adverse land and water changes through

- (a) improving water resources governance [3];
- (b) controlling land-use impacts such as non-point pollution and runoff, soil erosion, improving water availability, crop production and household income [5,44,45];
- (c) supporting carbon stocking in the soil and above ground [4];
- (d) supporting tourism development [46] and improved public health indicators [47,48];
- (e) improving the comprehension of the linkages between the dynamic land tenure and other watershed issues, and thus, designing appropriate actions [7].

Generally, integrated approaches record multiple impacts given the holistic intention in design [49]. The positive contribution of integrated approaches continues to record an initiation of more issue-based integrated approaches, a case of the United Nations Agency 'one health approach' following incidences of 'animal-human-environmental ecosystem' public health concerns, such as the outbreak and spread of coronaviruses [29,40,41,50,51]. Other approaches include the Integrated Watershed Management (IWM), Integrated Water Resources Management (IWRM), Collaborative Forestry Management (CFM), Integrated Soil Fertility Management (ISFM), and Integrated Disaster Risk Reduction (IDRR), among others.

Various definitions exist for a given approach; for instance, watershed management relates to organising and guiding land, water, and other natural resources used to provide the appropriate goods and services while mitigating the impacts on the watershed resources. The process also involves socio-economic, institutional, and biophysical inter-relationships and a connection between upland and downstream areas [34]. The integrates water resources management refers to a process that promotes the coordinated development and management of water, land and related resources to maximise the resultant economic and social welfare equitably without compromising the sustainability of vital ecosystems [42]. Observably, the definitions and, thus, approaches relate to some degree. therefore, we are collectively referring to related approaches as "integrated watershed management approaches in this paper going forward. Our working definition for integrated watershed management approaches recognises that certain integrated approaches' spatial and thematic focus may vary. However, such an approach considers all relevant resources and issues during resource management and governance to achieve physical, environmental, health and socio-economic goals at a given time and space. Such integrated approaches dwell on a scientific acknowledgement of the interconnectedness of earth resources and issues and the needed management and governance. In that regard, working within defined scales, preferably physical land hydrological units such as basins and watersheds, are applied to targeting multidisciplinary and multi-institutional connections [34,52].

However, gaps exist with integrated approaches application, given a continuously changing environment, linked global actions and impacts landscape, multi-sectoral actions needed [53–56]. In consequence, the operations of integrated watershed management are not only multi-disciplinary but also multi-level. At the watershed level, some challenges included the sustainability of the measures post the intensive project implementation phases [6]. Furthermore, integrated approaches also fail to ensure a balanced trade-off between conservation and development as the stakeholders perceive conservation as a costly choice with limited tangible returns in a short time or costly to maintain compared to other social-economic investments [57]. Contracted debates emerge, especially regarding the fixation on the terminologies and the limited accommodation of contextual innovations. The points of discussion or concern might differ between the natural, social, political, and institutional environmental disciplinary groups [58,59]. Depending on when one interacts with the terminologies and approaches for the first time, the questions of whether the approaches work surfaces [60], given the relatively large spatial distribution of all land and water resources to consider in each hydrological unit [36,37,52]. As such, debates arise as to whether the approaches suit only institutional and associative levels that create an enabling environment and not operational levels that emphasize resource management outcomes, thus more about governance than management. In addition, a debate suggests that to achieve effective integrated watershed management, catchment-level management activities and issues, as well as institutional processes and issues at the legislation level, need to be addressed simultaneously and holistically.

Accordingly, integrated approaches improvements are continuous, with suggestions of integrating biophysical and socio-economic data for decisions making [61,61]. Other suggestions include examining the legal frameworks [28], the approaches in the larger frame of resources management and governance [62] and clarification of conceptual definitions and views [59].

## 2.2. *Integrated Watershed Management and Land Tenure Relation Scenarios*

The land is a medium of integrated watershed management, and thus the relationship defined as land tenure gains attention as a conservation factor [10,17,63]. Land tenure relates to integrated watershed management by driving changes through influencing decisions, and an incentive to sustainable land management practices adoption. We document many of these scenarios in a review article [7]. The significance of land tenure lies in it being an institution of “rules invented by societies to regulate behavior. Rules of tenure define how property rights to land occur within societies. They (the rules) define how access is granted to rights to use, control, and transfer land and associated responsibilities and restraints. In simple terms, land tenure systems determine who can use what resources for how long and under what conditions”, according to the FAO [64]. These systems occur as nationalized, customary, leasehold, and freehold systems in some places, and an essential factor and tool for sustainability, degradation neutrality and responsive resource distribution and planning [19,44,65].

Integrated watershed management approaches and actions targeting water catchments deal with land tenure and related rights in general but categorically private and public property regimes and rights. Private lands usually are the majority compared to public lands in most countries [66]. Therefore, sustainability and equity involve mobilizing private and public property rights regimes to enhance public tenure protection and conservation and is a significant part of environmental legislation [33,66–70]. However, the process of mobilizing private land tenure for the public good and services faces challenges regarding effectiveness, accountability and ‘green grabbing’, among others [71]. There is substantial coverage of the public–private land tenure relationship in the literature on property regimes and rights. Particularly examining the common property, also known as government, state or no private claim property and private property [72,73]. Notably, the discussion signifies the complexity of private and public property rights when attempting to achieve-ecological goals, thus demanding matching institutional and policy coherence [74]. The discussion

also extends into the defining of property regimes, rules, duties, rights, recommended theories and institutional approaches and the disputing the state-led approach to property rights as a better custodian compared to communal and private regimes [53,75,76]. Adding to the complex situation is the growing scarcity of resources, while others are expensive for private affordability; as such, the need for private and shared property institutions and organizations to ensure equity is inevitable [77]. Overall, blending private and public property regimes and frameworks for conservation, equity, and sustainability is a continuous challenge [32,33,66,67].

Experiences drawn from integrated watershed management applications indicate the significance of property rights in land, with the: (a) distribution of resource rights affecting the distribution of costs and subsequent monitoring needs; (b) rights administration and regulatory remedies tend to restrict certain aspects of watershed use, affecting user groups either positively or negatively leading to resentment and assertion of rights by the affected groups in unintended ways such as encroachment; (c), integrated approaches benefit landowners more than groups with limited land rights; (d) thus leading to inequity during the distribution of benefits, especially the socio-economic benefits of integrated watershed approaches, and leaving several stakeholders satisfaction [78].

Catchments, therefore, may compose an amalgamation of property rights in water [79], land and related resources [69,80], fisheries and other natural resources, among others [72], in categories of private, public and other tenure systems [73,77], and a spatial distribution and co-existence situation differing from one place to another. In this case, the situation is less understood in the Lake Victoria basin of East Africa, especially, how it affects integrated watershed management.

### *2.3. Prevailing Considerations for Integrated Watershed Management Responsive Legislation*

Integrated approaches seek to achieve integration of human and natural systems [42], to vision and ably manage resources in a cross-cutting way, meet different demands and ensure environmental sustainability. Integrated watershed management approaches also desire and aim to contribute to resource frameworks enabling; (a) collaboration and coordination; (b) stakeholder participation; (c) innovation experimentation; (d) recognition of multiple scales of action [81], to understand the stakeholders' roles, obligations, rights, and legitimacies [27]. Integration aims to achieve other objectives, including social and ecological justice, which is a vital component of the legislative agenda and the acceptability of sustainability actions [67]. However, limited integration occurs, leading to ineffectiveness of the approaches according to a United Nations report evaluating IWRM progress as a case [2]. The limited occurrence of 'integration', may be due to various factors, such as conventional institutional setups, integration costs, weak governance, and varying conceptualizations of the approaches [62,82,83]. Nonetheless, the very integrated approaches bear a related responsibility of constructing the needed institutional framework and enabling environment. Respectively, processes devised earlier by creating catchment or basin management and governance boards and multiple interest committees indicate organizational and institutional decentralizations as incapacitated with limited power and control over resources [84,85]. In other cases, we observe integrated approaches improving governance [3], and in other cases, integrated watershed management approaches and interventions are achieved with conventional institutional and legislative frameworks, occasionally supplemented by moderate institutional modifications, high supervision, more financial resources, decentralization, and a strong will to learn and succeed in delivering the intended outcome. In effect, contrasting results exhibit at large or state-wide scale applications.

Continuing with integrated approaches means navigating new demands, such as land tenure and governance factors decisively through legislation. Responsive legislation to integrated watershed management approaches ought to accommodate the character of integrated watershed management approaches which tend to be prescriptive, thus, with pre-set guidelines, discursive as a power and values point of reference, and practical with management measures that encounter land tenure dynamics [39]. Integrated water-

shed management approaches success also depends on institutional arrangements and strength [86]. The pursuit of a legal regime accommodative of integrated watershed management approaches, however, also raises some questions, such as the degree of desirable and feasible integration and the extent to which conventional laws need altering. Other challenges of taking a legislative track relate to consolidating and coordinating the issues for which legislation is due [87]. Suggestions for reviews fit for sustainability guide reformations to serve heterogenous groups, including small-scale landowners, firms, corporations, governments, private property rights, differentiated interests, variable power, and rights and responsibilities to cause sustainability transformations [67]. Legislative reforms must also ensure that anthropocentric and ecocentric rights are balanced to holistically address the earth's challenges in this Anthropocene age [88]. Particularly, legislation responsive to integrated watershed management approaches must ably mobilize private tenure into public sustainability framework equitably [32]. The shift also recognizes the application of international and cross-border treaties, conventions, and legislation for land tenure, environmental resources, issues management and governance [32,79,89,90], which tend to produce varying outcomes as affected by local context and effects, some relating to land tenure [91]. Furthermore, tenure responsiveness is essential in catchment management measures such as land use planning and landscape restoration initiatives. The view majorly appreciates land tenure responsiveness as a means to improve land tenure security, which is a critical factor in achieving various socioeconomic and environmental sustainability goals [19,92]. However, land tenure is dynamic regarding tenure systems, form, security, and institutional framework [20,93]. The dynamics result in diverse property rights, regimes, and strengths [84], notably a legislative challenge during catchment environmental management. The diverse tenure regime situation also turns legally complex within the sustainability transition discourses [67,94]. Secure tenure rights, such as perpetual land ownership rights, tend to limit legislative enforcement of conservation-related easements. As such, reconciling eco-justice and equality, especially intergenerational equity, which is linked to sustainability [28] requires a more efficient approach with a coherent enabling environment. As the debates continue, additional contextual information is essential to achieve the desired enabling environment. In this case, relating to the distribution and co-existence relationship of private and public land tenure and other land tenure scenarios in the catchments and the level of responsiveness of the prevailing legislation to integrated watershed management approaches amidst land tenure issues.

### 3. Materials and Methods

#### 3.1. Approach to the Study

We apply a case study approach, purposively selecting Uganda and the country section of the Lake Victoria basin. The decision is, among other reasons, informed by the possibility of examining three sub-catchments bearing individual land tenure systems: Customary, Freehold and Mailo tenure at scale, in proximity, and exposed to integrated approaches and shared legislation. Moreover, the case study approach can contextually examine unique environmental and socio-economic relations and aspects at a given place, say catchment, that is scalable [95–97]. As such, we find the approach appropriate to a paper that examines local cases and informs the broader appreciation of integrated approaches and related legislative responsiveness.

#### 3.2. Data Acquisition and Processing

The study applies data from secondary and primary sources. The primary data collected from three purposively selected sample sub-catchments in 2020 answers questions about land tenure scenarios affecting integrated watershed management, such as the private–public land tenure co-existence and adopting sustainable land use practices. We apply survey techniques of participatory mapping of catchment physical environmental conditions, especially the land use and land cover, through observations supported by a checklist and household snowball sampling supported with a questionnaire. The question-

naire and checklists content includes the sustainable land use practice adapted from the Uganda strategic investment framework for sustainable land management 2010–2020 and the land use and land covers classes in Mwanjalolo, M. et al., 2018, which locates the some private (outside protected areas) and public (protected areas) tenures [98,99]. The target sample population and area are in villages exposed to integrated watershed management activities and near public and private land tenure-sensitive areas, such as wetlands, lakes and riverbanks, forests, and hilly regions.

The data analysis takes on both qualitative and descriptive statistical formats involving the responses of 152 households considered complete. The sub-catchments include the river Rwizi (Native freehold land tenure system and  $n = 61$ ), the lake Wamala sub-catchment (Mailo land tenure system and  $n = 44$ ) and the Upper Victoria catchment (Customary land tenure system and  $n = 47$ ). The sample size is considered statistically viable for small sample analyses. The focus area's spatial extent and land tenure systems as independent variables also played a role in this decision. We answer the questions about the responsiveness of the prevailing relevant legislation to integrated watershed management and land tenure scenarios. After that, we identify legislative remedies recommendable for a legislative shift and improvement based on secondary data. We source the relevant documents from online databases from the Food and Agriculture Organisation of the United [100,101], and the Uganda Legal Information Institute sites [102]. The collection is typically considered the relevant framework or integrated watershed management in Uganda [31,103,104]. The final sample considers four Acts of Parliament as the most relevant: the National Environment Act 2019, the Water Act 1997, the Land Act 1998, and the Forestry and Tree Planting Act 2003. Geographical Information System data layers applied for the study area map are sourced from open access data bases and Uganda institutions [105,106].

### 3.3. Study Area

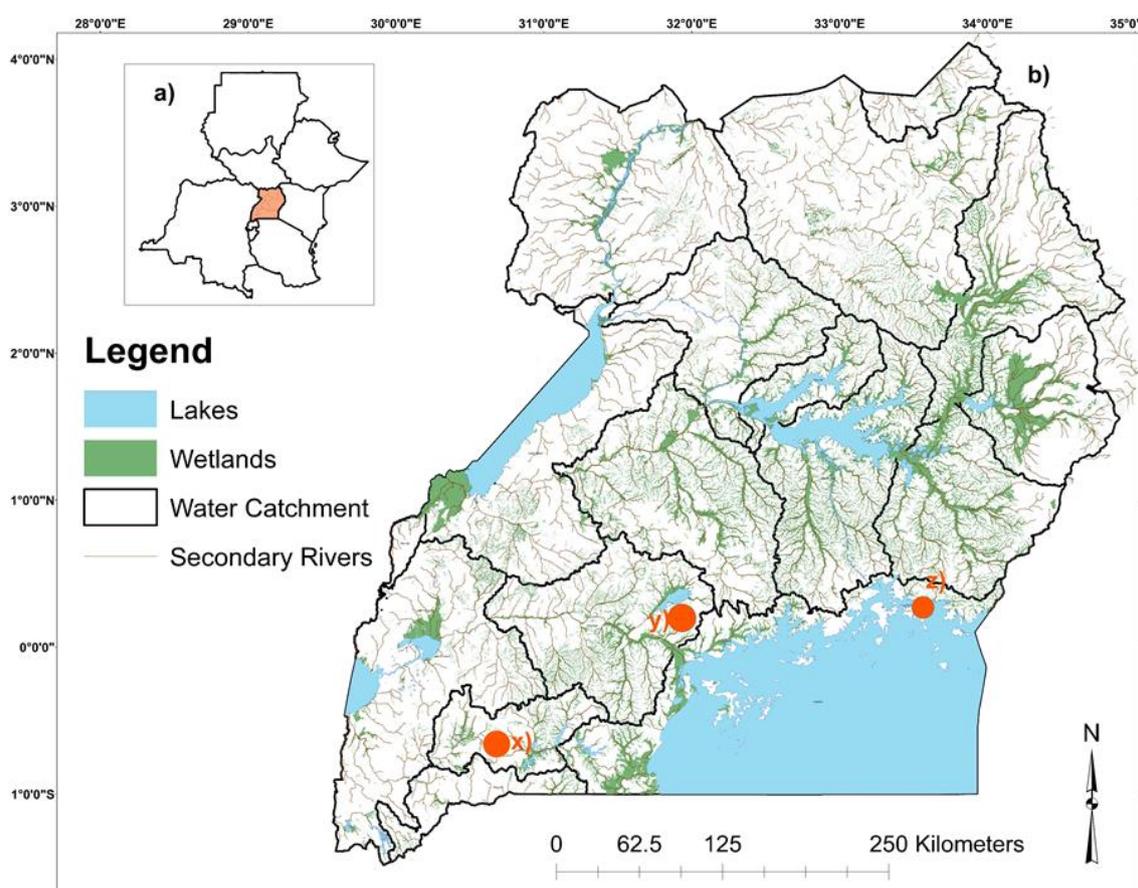
The study area includes Uganda country and three sub-catchments selected as a case study for tenure in the Ugandan sector of the Lake Victoria Basin. The total area of Uganda is estimated at 241,550.7 km<sup>2</sup>, with 41,027.4 km<sup>2</sup> (17%) of water and wetland areas—in consequence, the relevance of integrated water resources management approaches becomes obvious. The climate in the study areas is humid tropical, with annual temperatures ranging between 15 °C to 30 °C and annual rainfall between 750 mm and 2100 mm; substantial variation of average climate data relates to a varying topographic gradient. However, 90% of the area experiences an average potential evaporation rate exceeding the respective annual rainfall besides the areas around the Lake Victoria basin and the mountainous landscape sections of the Rwenzori, Elgon and Kabale. Moreover, due to the character of Uganda as a landlocked country, 69% of the surface waters are transboundary [99,107,108]. The regional economy is predominantly agro-based, characterized by small-scale agricultural holdings, rain-fed agriculture and most habitants engaged in primary resource value chain activities [99,108,109].

The case study areas are multi-ethnic and multi-customary institutional by character, resulting in diverse socio-cultural practices concerning land resources at the various sub-catchments. However, collectively, land tenure practices are legally classified into four land tenure systems: Customary, Freehold, Mailo, and Leasehold, but this study focuses on three systems leaving out Leasehold, given their spatial spread to catchment scale. The land tenure systems vary due to historical, cultural, and political administration conditions [93,110]. Thus, formal, and informal land tenure classes, such as 'official' and 'native' freeholds and leaseholds, essentially superimpose or accommodate customary practices and systems.

Land and integrated watershed management relevant legislations in Uganda mostly date to the early 1990s, including the Country's constitution declaring that land belongs to the citizens. At the same time, water resources and protected areas are a public resource under state stewardship [111,112]. As such, both private and public tenures co-exist and form the background of this study. One of the significant changes is the county's demogra-

phy, with a current growth rate of the population of 3.0–3.3%, documented impressively by an increase of total population of 2,466,325 in 1911 within a century to 34,634,650 in 2014 [108,113]. The collective characteristics in the area significantly influence regional land use and cover, management approaches, and effectiveness.

In the study area (Figure 1), private tenure co-exist with public tenure and rights. The public land and water resources, translating as public tenure and property rights, include mostly rivers, lakes, streams, wells, wetlands, national forests or game reserves and parks, and other declared land and water resources for public protection interest. However, managing and governing the co-existing tenures faces persistent challenges, some due to gaps between legislative aspirations and the practice, enforcement of due measures, attention to social impacts as to the physical environmental impacts, and tackling power imbalances and conflicts between the socio-political and technical administrative arms [114–118]. Since the very legislations are considered for an integrated management of the resources in the area [31], we can confirm challenges exists and reforms are due.



**Figure 1.** A catchment-based location map of Uganda, Eastern Africa (a). The main map (b) shows the distribution of selected water resources such as rivers, lakes, and wetlands; these are also considered as public tenure and rights resources. The resources transverse land which belongs to the citizens according to the prevailing legislation, exceptional cases of the land are public tenure such as parks, forest reserves among others. The orange dots indicate the catchments sampled for land tenure system-specific assessments with River Rwizi being Native freehold (x) for Lake Wamala being Mailo tenure (y) and Upper Victoria for Customary land tenure systems (z).

## 4. Results and Discussion

### 4.1. Characterisation of the Private and Public Land Tenure Co-Existence in Watersheds

Our characterization of the private–public land tenure relation builds on previous pieces of evidences relating land tenure in general to integrated watershed management [7],

but lacking a perspective of how the relations happen under different land tenure systems, multiple land property regimes driven processes, and catchments. The participatory mapping engages sample households of the land use and land cover the situation in their immediate surroundings. The characterisation and interpretation of the public–private land tenure co-existence according to the land use and the land cover situation. Very discrete private and public land tenure data in the studied areas’ unavailability persist for several reasons, including limited land registration to show the distribution of the public and private tenure in each setting as desired. As such, the description of the public–private tenure co-existence using a qualitative method is tentative in indicating which catchment land use and cover classes are particularly experiencing pressure and changes.

We enlist at least five public and private land tenure co-existence dimensions observed in the studied area to interpret the co-existence. The resources include lands and related resources pronounced under state and community custodianship for the public good traversing private lands.

- (a) Transboundary dimension: for land uses and land cover such as wetlands traversing private and public land tenures.
- (b) Proximity dimension: for land uses and land cover cases where defined boundaries exist that separate private and public land tenures (including protected areas such as game or forest reserves and parks).
- (c) Temporal use dimension: private land rights temporarily occur on public land and vice versa. For instance, collecting fuelwood, growing seasonal crops, and granting leases and easements.
- (d) The land surface–subsurface dimension: for land use cases where private land tenure and public land tenure concurrently exist, for instance, land on the surface could be private tenure, but the sub-surface content such as minerals, oil, and gas and groundwater are public resources
- (e) Legal dimension: where any land is considerable for public land tenure as and when the need arises, and the reverse possibly according to law. Instances include easements, reserve declarations, and other public works deemed needed.
- (f) The above-ground tenures dimension: for land use cases of resources other than land that bear either private or public tenure, such as forestry resources.

The above-highlighted dimensions mainly occur randomly, signifying a complex character to be observed in the private and public land tenure and rights co-existence. As a result, the possibility of tenure encroachment in the catchments is high, and we interpret the use of public land tenures for private tenure activities as encroachment. We observe tenure encroachment affecting mainly wetland areas and forest reserve lands for livestock and crop growing, among other activities. In principle, wetlands are primarily public land tenure, with most human uses subject to regulation according to prevailing legislation. Nevertheless, there is reported use, both regulated and unregulated, in the studied catchments. Exceptional cases where sections of public land tenure existed on privately registered land before the coming into force of Uganda’s 1995 constitutional declarations exist, especially in the Mailo tenure sub-catchment. However, using such private lands is also subject to agency regulations according to the current legislation.

Furthermore, the trajectory of tenure encroachment likely continues if the dominant factors continue, primarily relating to agricultural land use, subsistence and commercial farming arrangements and climate change affecting rainfall patterns and distribution over land. Encroachment practices occur for both small-scale and large-scale practices. Individual, smallholder, corporate, and government power relations occur in the catchments. For instance, although agriculture was an essential practice defining the private–public tenure co-existence, it varied, with commercial agriculture mainly sugarcane (*Saccharum officinarum* spp.) and rice (*Oryza sativa* spp.) and performed on an out-grower farmer-company contract basis occurring in the customary land tenure (upper Victoria) catchments unlike other sub-catchments of the Native freehold and Mailo tenure system. Any agricultural

practices have implications on the local land use and tenure dynamics, especially where binding contracts are signed in respect.

In most cases, the demarcations between private and land tenures are unclear and not permanent due to land and related resources legislative ambiguities and changes, human manoeuvres, insufficient mapping information and the changing land use and cover. In this sense, the Mailo sub-catchment exhibits a more dynamic and complex public–private land tenure co-existence relationship, followed by the Customary sub-catchment (upper Victoria area) and the Native freehold sub-catchment (River Rwizi area).

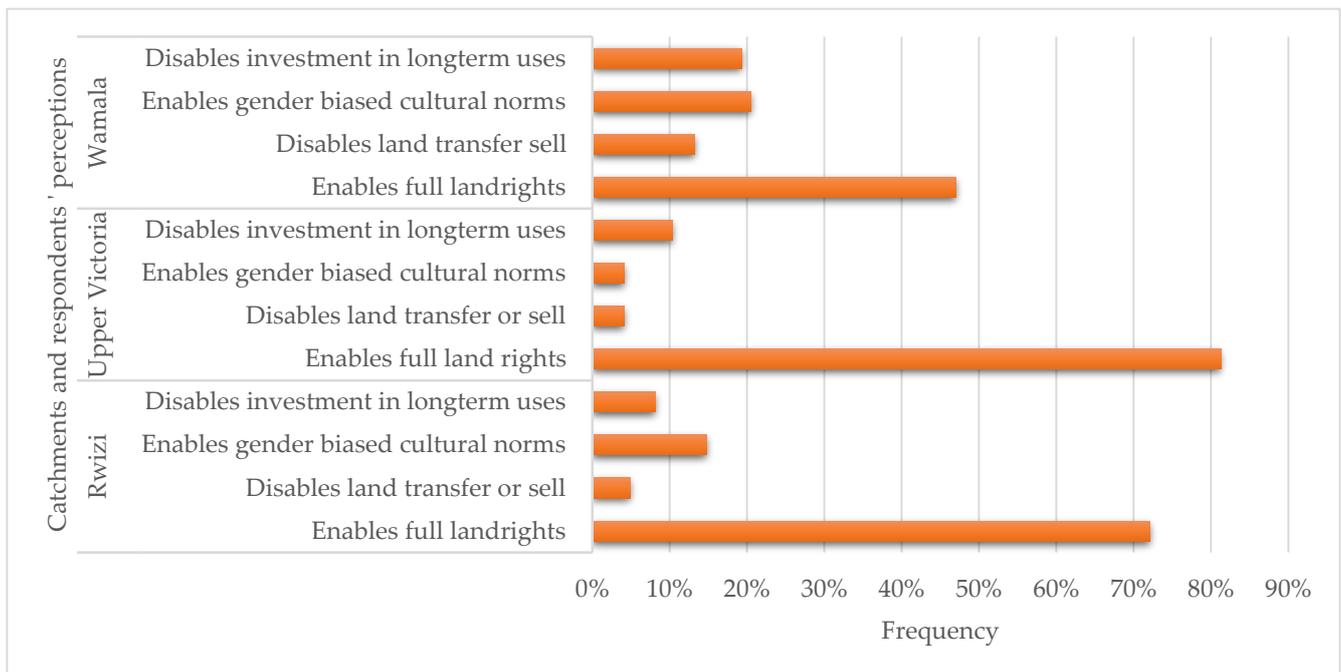
#### 4.2. Land Tenure Effect on Integrated Watershed Management

In this sub-section, we examine the effect of the catchment public–private land tenure co-existence within the context of varying land tenure systems, namely the Customary, Mailo, and Native freehold tenure systems and land tenure forms. We define *land tenure form* as the defined bundle of land rights given to an individual, group or entity under any given land tenure system. The land tenure forms include full land ownership or co-ownership, tenancy, custodianship, and short-term leases or use contracts. The land tenure systems considered are constitutionally defined due to the region’s historical, colonial, and cultural influences. Both private and public tenure occur on any other land tenure systems.

The results show how private land rights holders in areas where some integrated watershed management approaches and practices occur ensure sustainable land use and practices as they co-exist with the public tenures. The process identifies 20 sustainable land use management practices from the Uganda Strategic Investment Framework for Sustainable Land Management 2010–2020 [98]. The practices include those aiming to improve soil and water conservation, restore and maintain soil fertility, harvest water for production and water domestic use, and practices to increase forest cover or reduce pressure on forests and alternative livelihoods. The practices include conservation farming, afforestation and reforestation, integrated soil nutrient management, agroforestry, crop fallows, water and runoff harvesting, energy-saving stoves and kilns, controlled grazing, small-scale irrigation, and community watershed management.

Generally, every household applies some practices considered under the sustainable land management framework. However, no clear pattern is visible among the reporting household’s choice of sustainable land management practices (SLMP) to indicate consistency, strategic or systematic remediation of an identified challenge at scale, implying randomness. Respectively, more sustainable land management practices are compiled in the Wamala sub-catchment (Mailo land tenure system area), Upper Victoria (customary land tenure system area), and lastly, the Rwizi catchment (Native Freehold land tenure system).

Regarding whether the land tenure system and form affect the adoption of sustainable land use and management practice, the results in (Figure 2) are based on the land tenure system character of enabling (a) possession of full land rights, (b) gender biases in land inheritance and ownership norms, (c) land transfer or sale, and (d) investment in long-term sustainable land-use practices. A total of 72% of respondents have full land rights under the native freehold land tenure system (Rwizi sub-catchment), 81% have full land rights under the customary land tenure system (Upper Victoria sub-catchment), and 47% have full land rights under the Mailo land tenure system (Wamala sub-catchment). On the other hand, the land tenure systems variably disable long-term investments in sustainable management practices, with interest to invest in long-term practices limited in the Mailo tenure sub-catchment at 19%, compared to 10% and 8% in the Customary and Native freehold sub-catchments, respectively. Furthermore, gender-biased cultural norms relating to land tenure persist across all three study areas independent from the land tenure system.



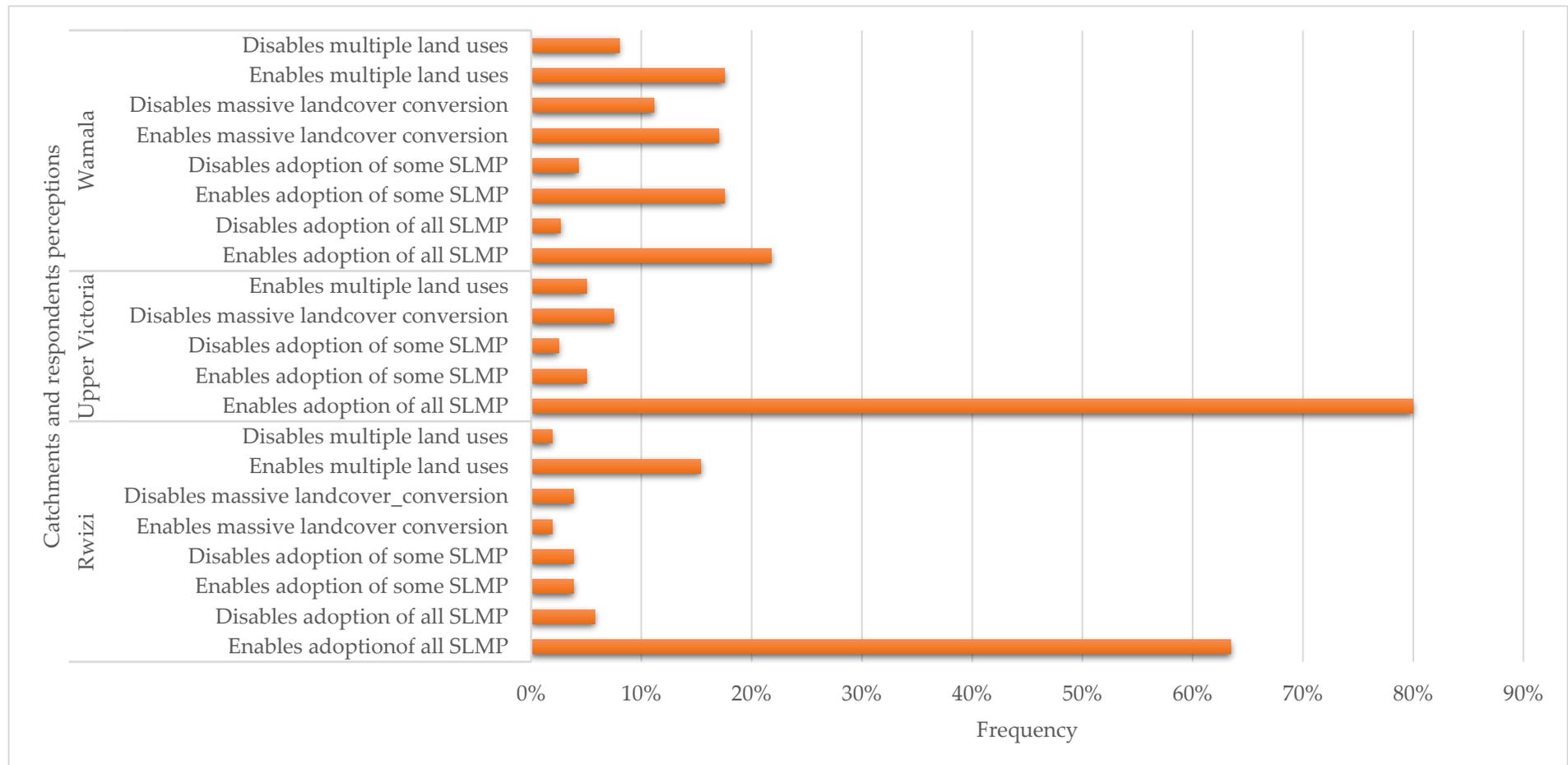
**Figure 2.** Respondent's Perceptions regarding the Effect of Land Tenure Systems on Select Land Use and Management Decisions and Practices Differentiated for the Three Study Areas Tenure Systems That Is Native Freehold ( $n = 61$ ), Customary ( $n = 41$ ) and Mailo Tenure ( $n = 44$ ).

The land tenure form (Figure 3) character relates to enabling the households; (a) to adopt some or all recommended sustainable land management practices, (b) enable multiple land uses, and (c) enable massive land cover conversions. For example, in the native freehold land tenure (Rwizi sub-catchment), more than 80% of the respondents perceive the tenure form held enables the adoption of all sustainable land management practices. In comparison, 64% and 21% hold a similar perception of the Customary tenure (Upper Victoria sub-catchment) and the Mailo land tenure (Wamala sub-catchment), respectively. However, only 16% of the respondents of the same group in the native freehold land tenure, 5% in customary land tenure and 17% in Mailo land tenure agree that multiple land uses are possible at a given interval.

The perception about the current land tenure form enabling massive land cover conversions is limited, with the highest response being 17% of the respondents in the Mailo tenure area.

Overall, the land tenure forms held according to the respondents enable (a) multiple land uses but at varying intervals, (b) the adoption of all or some of the sustainable land management practices (c) essentially disables massive land cover conversion.

Although the land tenure form is similar by title, marginal differences occur per land tenure system. For example, the rights of a landowner under the Mailo system might differ from those of a landowner under the customary system and native freehold system.



**Figure 3.** Respondents' Perceptions regarding the Effect of Land Tenure Form on Select Sustainable Land Management Practices (SLMP) Decisions and Practices Differentiated for the Three Study Areas under Native Freehold in Rwizi Sub-catchment ( $n = 61$ ), Customary Tenure in Victoria Subcatchment ( $n = 41$ ) and Mailo in Wamala Catchment ( $n = 44$ ).

#### 4.3. Implications of the Land Tenure Scenarios to Integrated Watershed Management Approaches

The two scenarios of private–public land tenure co-existence situation and the respective possibilities under the varying land tenure (systems and forms) have implications for integrated watershed management.

##### 4.3.1. Implications of the Public–Private Tenure Co-existence in Integrated Watershed Management

The general view on the public–private land tenure relationship in the case study indicates a complex co-existence, with increasing pressure against public tenures, especially wetlands. With such vulnerability, an occasion of turning sections of public land tenure to private tenure or private land acquisitions for public land needs is foreseeable. Both scenarios likely cause tension, conflict, violation of rights, and incur high resource management and governance costs, characterizing the integrated watershed management processes in the study areas.

There is significant private land tenure in Uganda, where an estimated 85% of forests and woodlands exist under private tenure and customary practices. In comparison, only 5.6% occur under forest reserves and 9% in Uganda's National Parks and Wildlife reserve management systems [109]. Adding to the situation, most public land in the form of wetlands, grasslands, and waters also transverse or occur in areas outside physically 'protected' spaces, surrounded by private and mostly informal tenure systems. As such, extensive losses of forests and woodlands occur [99,109], despite a relevant legislative frame for controls present [104,117]. Indeed, the legislation framework struggles to manage the co-existence of tenure arrangements as it is characterized by tension, conflict, violation of rights, and high management costs [115,117,119]. The increased vulnerability and susceptibility of the public–private land tenure co-existence is due to annexation and conversion of public lands to private interest, private land acquisitions for public land needs such as restoration and maintenance of subsequent environmental rights, and frictions in the land regime. In effect, multiple land and resources administration interests and lines of governance exist due to the fragmented land uses. Land fragmentation, for instance, results from land divisions to meet individual land needs and the acquisition of property rights, registering both limiting and positive effects on land use, investment decisions and administration as observed elsewhere [120,121].

Co-existence is a term commonly used but variably interpreted among various disciplines and probably still thrives on contexts for meaning [122]. We derive our applicable meaning from the ecological and environmental co-existence studies where co-existence refers to the long-term co-persistence of different species in a given niche [123]; in this case, the study is considering the public–private land tenure regimes as niched in a watershed. The co-existence of species situation is equally related to what with observed with the land tenure situation amidst global changes, where the relationship depicts competition, facilitation, and invasion as some of the descriptive characteristics of co-existence [124]. Co-existing systems occasionally result in the thriving or collapse of ecosystems, learning from instances of humans and wildlife co-existing as private lands nearing public land tenures in the form of game reserves and other protected areas [125].

Techniques to ensure harmonious co-existence of the private and public tenures include the creation of protected areas. However, due to increased social and land-related needs pressure, changing perceptions and valuing of such protected areas, challenges, and limitations occur [126–128]. For instance, protected areas ensure biodiversity protection, deforestation avoidance, and livelihoods support, among other advantages [129–131], but fall short in ensuring financial efficiency, management effectiveness, carbon and other emissions storage, and avoidance of land grabbing [127,132–135]. Therefore, managing the various human-led drivers of land use changes and the insufficiency of protected areas to attain conservation goals requires attention to private land tenure. Indeed, processes to expand protected areas and strengthen private tenure for conservation are ongoing, albeit susceptible to socio-ecological malpractices such as land grabbing and dispossession

of indigenous community's land [134,135]. Nevertheless, private lands are needed to complement the sustainability drive and state-protected public lands, which are considered insufficient [32,71].

Considering the public–private co-existence adds a dynamic to consider for the effective adoption of sustainable land management practices during integrated watershed management. Importantly, the process supports understanding the multiple dimensions of land tenure and how it relates to conservation behaviors and measurement limitations that tend to render the discussion inconclusive [136]. Many such land tenure dimensions and behaviors relate to private property rights, which tend to fail the functionality of the public interests, especially those related to ecosystems [69]. Catchments with private and public land tenures exhibit a mixture of willingness and unwillingness to cooperate, and residents' interests, priorities, and financial capacities. Such areas are also politically sensitive in case of land appropriation for conservation or other attempts at engaging with private lands [137]. Owing to the possibility of needing more land for public tenure and services or vice versa, the claiming or reclaiming of either public or private lands, compensations are costly, and incentives are perverse [138]. Additional threats to considering private lands for public sustainability include effectiveness, inefficacy, and value conflict-related concerns [71].

The private–public tenure scenario leads to multiple legislative dimensions, as land is a multidimensional use resource, but also as the dimensions we mapped in the catchment indicate. Thus, the possibility of legal overlaps and power plays in certain catchments [32,67]. As such, blending private and public tenures in conservation demands legislative transitions and reforms [66,67]. The latter is especially true in the studied catchments and elsewhere, as we learn that as the land changes hands, differences also exist among subsequent landowner interests, the land size reduces and occasionally, the chances of land conflicts increase. Thus, considering private and public land tenures while applying integrated management approaches and related legal administrations is timely.

#### 4.3.2. Implications of the Prevailing Land Tenure Systems and Forms to Integrated Watershed Management Approaches

In an area with *de jure* and *de facto* land governance and administration systems, private land tenure practices tend to differ according to the tenure system, affecting the public–private land tenure relations in catchments. In this case, Customary, Mailo, and Native freehold tenure systems are dominant in Uganda. The three land tenure systems slightly differ in title, background history, and rights framework. Results indicate that the perceptions about the prevailing land tenure are variable but oriented towards enabling integrated watershed management actions such as sustainable land use practices. However, sustainable land use and management practices adoption patterns still need to be more strategic and sufficient as desired under the Uganda Strategic Investment Framework for Sustainable Land Management 2010–2020 and other relevant policies and programs.

Although the perceptions about the tenure role are generally positive, gaps exist, such as tenure insecurity. Land tenure security influences the adoption of sustainable land use measures [17,63,139], and is a significant variable for favorable decision making in conservation and sustainable land use, though not exclusive [10,15].

It is also common for land tenure security assurance to be associated with various land tenure forms and subsequent documentation [10,140,141]. Compared to the Native freehold (easily registrable to freehold title, perpetuity) and Mailo land tenure systems (mostly registered with title), we observed some perspectives contrary to the notion when respondents in the Customary land tenure system (mostly unregistered) expressed a positive perception of the tenure system's ability to facilitate sustainable land management practices. Furthermore, more respondents reported attaining full land rights in the customary tenure catchment than in the Native freehold and Mailo land tenure-dominated study catchments.

Despite a few opposing views in the available literature, most of the literature tends to see customary land tenure as a negative influence on conservation and land productivity. As a result, others prefer registered lands over customary tenure systems [13,140,142,143]. Among our study catchments, the Mailo land tenure system characterizes land titling and registration since the 1900s. Nevertheless, some tenure holders reported limitations associated with land rights due to gender biases, inability to enjoy full land rights, and unwillingness to invest in long-term sustainable land use (see Figure 3). In other ‘formalized’ land tenure systems in the global south, findings not directly linking land titling to mostly positive outcomes persist [18,144–146]. This follows a disconnect between the conceptualized results expected from land formalization and effective catchment management outcomes owing to the relatively patchy, slow, and, in some cases, contested land reforms [111,142,147]. Additional limitations are likely due to numerous reports of persistent gender biases, limited land transferability and commitment to long-term investments in sustainable land use and management practices, and unmatched policy implementation persisting.

#### *4.4. Assessing the Legislative Responsiveness to the Integrated Watershed Management Approaches and Land Tenure*

The previous section of the paper provides evidence of the land tenure and integrated watershed management relationship and situation as background information for legislation. In this third section of the paper, we assess select legislation’s relevant responsiveness to the integrated watershed management approaches amidst the land tenure and related dynamics. Land tenure is also an institution of rules invented by society to regulate behaviour and property rights to land allocation [67], while integrated watershed management seeks an enabling environment as one of the pillars and instruments for success [9,26,148]. As such, legislation is a cornerstone for land reforms and integrated watershed management improvements.

In assessing whether the prevailing legislations in the study area are at par with the needs, an assessment criterion of selected indicators is applied when reviewing the documents. First, we score the results qualitatively using a four point Linkert scale and a scoring matrix where; Low (the idea/indicator is traceable, but abstract >25), Moderate (the idea/indicator is traceable, clear, but partial to presentation expectation >50), High (the idea/indicator is traceable, clear, satisfactory to presentation expectation >75), and Undetected (the idea/indicator is not traceable or very abstract for basic articulation = 0). The indicators are according to the responsiveness on thematic areas of integrated approaches, land tenure, and holistic land tenure and integrated approaches (see Table 1). The legislations mainly considered are four Acts of Parliament: the National Environment Act 2019, the Water Act 1995, the Land Act 1998, and the Forestry and Tree planting Act 2003. In addition, complimentary cross-reviews include the Water Regulations 1997 and National Water Policy 1999, The National Environment (Hilly and Mountainous Area Management) Regulations 2000, The National Wetlands, Riverbanks and Lake Shores Regulations 2000, the National Agricultural Advisory Services Act 2001, the Uganda Constitution 1995, Local Government Act 1997, Land Acquisition Act 1965, and the Climate Change Act 2021.

##### *4.4.1. Responsiveness to Integrated Watershed Management Approaches*

There are differences in the responsiveness of the four Acts for water, forestry and tree planting, environment, and land to integrated watershed management approaches. Accordingly, using the thematic measurement indicators in Table 1, the Land 1998, Water 1997, Trees, and Forest Acts 2000 score a low remark. In contrast, the Environment Act 2019 is moderately responsive, signaling the likelihood of conceiving new legislative needs correlating with the time of enactment. The performance of the indicators measured against the score matrix indicates:

- a. All the Acts include the legal provision for cross-referencing or consultation across relevant Acts, thereby legally providing for interconnecting to a wide range of wa-

tershed issues. The requirement to cross-consult can also indicate acknowledging the interconnectedness of resources and issues in integrated watershed management approaches.

- b. All the Acts include the principles associated with integrated watershed management approaches, such as sustainability, economic efficiency, equity, participation, and the recognition of the role of women.
- c. All the Acts also include provisions for institutional collaboration.
- d. To a reasonable degree, all the Acts provide for access to non-confidential data and information.

**Table 1.** Results of the Legislative Responsiveness Score of the Four Acts.

Thematic Area	Water Act	Forestry & Trees Act	Land Act	Environment Act	
Indicators	Score	Score	Score	Score	
Responsiveness to Integrated watershed management approaches	Acknowledgement of resource interconnectedness and so, the management and governance	U	M	M	M
	Recognition of integrated approaches' common principles pillars such as equity, economic efficiency, and environmental sustainability	M	M	L	H
	Requirements for relevant institutional collaboration and hierarchy of the organisation	M	M	M	M
	Recognition of the various land-based physical scales and transboundary nature of resources and management requirements	U	L	L	L
	Defines and requires multi-stakeholder actions and participation, including the role of women	L	L	L	H
	Provides conceptual examples or definitions of integrated approaches	U	U	U	U
	Responsiveness to Land tenure	Recognises and provides for the various land tenure systems	U	L	H
Recognises and provides for the various land tenure dynamics such as tenure form, tenure rights, security, land access modalities and the possible means of assurance or administration		L	L	M	L
Provides for current and projected land demands		L	M	M	M
Cognizant of the private and public land tenure rights and trends, co-existence challenges and provides for remedies		L	L	L	M
Provides for relational cognisance between land tenure and other socio-economic and ecological goals and requirements		U	U	L	U
Provides for accommodating and enabling updated land tenure and rights demands such as information access, digitalisation, women, and other gender rights	L	M	M	M	

Table 1. Cont.

Thematic Area		Water Act	Forestry & Trees Act	Land Act	Environment Act
	Indicators	Score	Score	Score	Score
Responsiveness to holistic integrated watershed management and land tenure	Recognises the role of land tenure in integrated watershed management (approaches)	M	M	M	M
	Provides for land tenure terms and responsibilities in the framework of integrated watershed management	U	L	U	L
	Underscores the role of the land legislation in improving integrated watershed management	U	L	U	L
	Underscores the role of other resource-relevant legislations to improve land tenure characteristics such as tenure security, equity among others.	U	U	U	U
	Provides for spatial and temporal variabilities of catchments and land tenure system	U	U	U	U
	Provide for conditions of legislative review, monitoring, and evaluation	H	H	H	H

However, there are observable limitations and gaps in the laws regarding integrated watershed management, and some are within the articles. They include:

- a. All Acts are considerably sectoral despite cross-referencing and an average score on the inclusion of relevant issues in the Environment Act.
- b. The Acts do not explicitly acknowledge the interconnectedness of watershed resources, issues, and related management governance.
- c. The Acts are considerably less precise in several provisions.
- d. The Acts do not provide definitions for integrated watershed management approaches, watersheds, or other physically delineated hydrological concepts.
- e. The Acts identify ministerial arrangements, institutional collaborations, processes, procedures, and stakeholders at higher institutional levels, leaving out the local community levels.
- f. Additionally, the intermittent attention to scale as a spatial factor is of concern. Integrated watershed management approaches aim for multiple scales and levels; the Acts reviewed mainly align with the country's administrative scales. Instances of perceiving and providing for the transboundary nature of resources and ideologies, other catchment-based scales and possibly the respective management and governance relate to international water laws and other cross-border treaties in some legislation.
- g. The National Environment Act 2019 has a legal provision guiding and requiring adherence to the environmental action plans by other sector agencies whenever dealing with matters related to the environment as defined by the Act. However, despite the individual action plans, similar legal guidance is lacking in the Water Act, Land Act, and Forestry and Tree Planting Act.

#### 4.4.2. Responsiveness to Land Tenure and Related Dynamics

While the Land Act scores moderately, the Water, Environment, Forestry and Tree Planting Acts bear a low consideration of land tenure, despite a very high indication of current and future land needs. Specifically, the Acts include provisions to require, access, and establish specific actions on any land through easements and acquisitions, especially for public work and authority. As such, all four Acts include provisions linking private

tenure to public tenure objectives such as conservation, including the prospects of land acquisition from private tenure holders through the Land Acquisition Act of 1965, a law that spells out the land compensation procedures to date. The Land Act 1998 has a moderate coverage of land tenure issues, despite some gaps and limitations in accommodating the complexity of the related changes since its enactment in 1998.

Generally observed in all the four Acts assessed is the indication of land as a centre of the action. The diverse interests and power over the same land contribute to the complex private and public land tenure coexistence situation and the likely conflicts the legislation should manage. The legislation needs to explicitly outline how particular land tenure dynamics may affect the enforcement of each Act, including how the diverse institutional priorities may proceed. Furthermore, while the Land Act contains most of the institutional arrangements relating to land, the Water, Forestry and Trees, and Environment Acts also introduce respective institutional arrangements, with multi-sectoral efforts reflected at Ministerial Committees and District Committees.

Nonetheless, conflicting institutional and legal impasses are present. For instance, the Water Act empowers the responsible officers to negotiate and award easements on any land without consulting with land lead agencies or institutions. Furthermore, the reliance on the 1965 Act on land acquisitions and compensation, yet several other Acts, including the constitution, are enacted post the 1990s, signalling potential legislative pitfalls.

Any considerations of land tenure in the Acts are still plot-oriented in perspective, with a limited conceptualisation of the possibility of tenure as a spatial and temporal resource. The plot-based view of land needs by each law leads to the possibility of overlapping rights and interests on certain lands, yet without apparent legal hierarchy's provision.

#### 4.4.3. Responsiveness to Holistic Integrated Approaches and Land Tenure

A shift towards integrated and tenure responsiveness requires legislation cognizant of individual and interconnected issues. In this case, the assessed Acts variably respond to integrated watershed management approaches and land tenure responsiveness, but also sections of the Land, Water, and Environment Act require land 'ownership' to be respectful to the land use plans, environmental requirements, and water protection. There are more land tenure forms than 'ownership'. Additional gaps include the absence of provisions demonstrating knowledge and acknowledgement of integrated watershed management approaches and land tenure in ensuring successful resources administration and sustainability as a concurrent act.

Management courses related to environmental or other resources are not required to ensure tenure issues responsiveness, nor are courses on land administration required to ensure environmental sustainability explicitly. As such, implementing one Act threatens or limits the success of another Act. Integrated approaches thrive on orderliness, in this case, clear legislative hierarchy and precedence, which are largely absent from the Acts, except for the Environment Act, which assumes and indicates legal superiority on environmental matters.

#### 4.4.4. Implications of the Legislative Responsiveness to Land Tenure and Integrated Approaches Findings

The Environment Act, Water Act, Forestry and Tree Planting Act and Land Acts' responsiveness is according to the pre-set thematic indicators, the score, and thus, varying observations. Therefore, the Environment, Forestry and Tree Planting Acts are moderate regarding integrated watershed management approaches responsiveness. Selective pointers to the rating decision regarding integrated approaches responsiveness include the observed inclusion and provision of most of the integrated approaches principles and goals in all assessed Acts. In addition, the legislation provides institutional collaboration, participation, information access, and possibilities for review, updating, and reform. The higher score is unattained due to the need for vivid definitions, citations, or recommendations of the integrated watershed management approaches, complementary provisions, and sufficient

provision for institutional coordination and power hierarchies. The Land Act is moderate in land tenure responsiveness, while the water law is of low responsiveness in all three thematic categories of indicators. All four Acts are abstract about the holistic indicators regarding land tenure and integrated watershed management, especially the Water and Land Act.

Although the Water Act, Forestry and Tree Planting Act, and Environment Act rate low on land tenure responsiveness, we confirm a significant need and dependence on the land. The Acts also consider private land tenures, thus, providing for land acquisition, including compulsory land acquisition using the Land Acquisition Act of 1965. However, the planned reliance on compulsory land acquisition to extend public tenure is likely an action that perpetuates land tenure insecurity (real and perceived), mass acquisitions and speculations, displacements, and incidental costs, among other land tenure challenges. In addition, some of the available compensatory remedies have so far indicated difficulties when using the land acquisition law of 1965, equally past due reformation. Additional procedures exist among practitioners' such as ensuring the Principles of Free Prior and Informed Consent (FPIC) in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Voluntary Guidelines on the Governance of Tenure of Land, Fisheries and Forests (VGGT) encounter legal limitations [149,150]. As such, the prevailing legislations are insufficient for the desired outputs of integrated watershed management.

Legislative reforms are due to allow a move from the low or moderate responsiveness of the prevailing legislation and the dependence on policy statements for integrated watershed management. For instance, attempts at integrated watershed management in the study area are primarily a policy action of the Uganda water policy of 1999, whose results based on land use and cover changes in the regions catchments confirm the possible level of integrated watershed management effectiveness [99,151,152]. Land use and cover changes pose a legislative challenge as it is more likely that legal evidence needed to claim ecological sensitivity and other decision-influencing indicators is lost. Relevant agencies will thus need to utilise coherent environmental history legal provisions empowering decision-making to overcome contracted legal proceedings. The changes in catchments also affect legal restoration benchmarks that characterise environmental impact assessments, for instance. The successes and challenges encountered in integrated watershed management indicate that the current sectoral legislations usually wound into a framework are failing to effect intended changes [31,114,153,154].

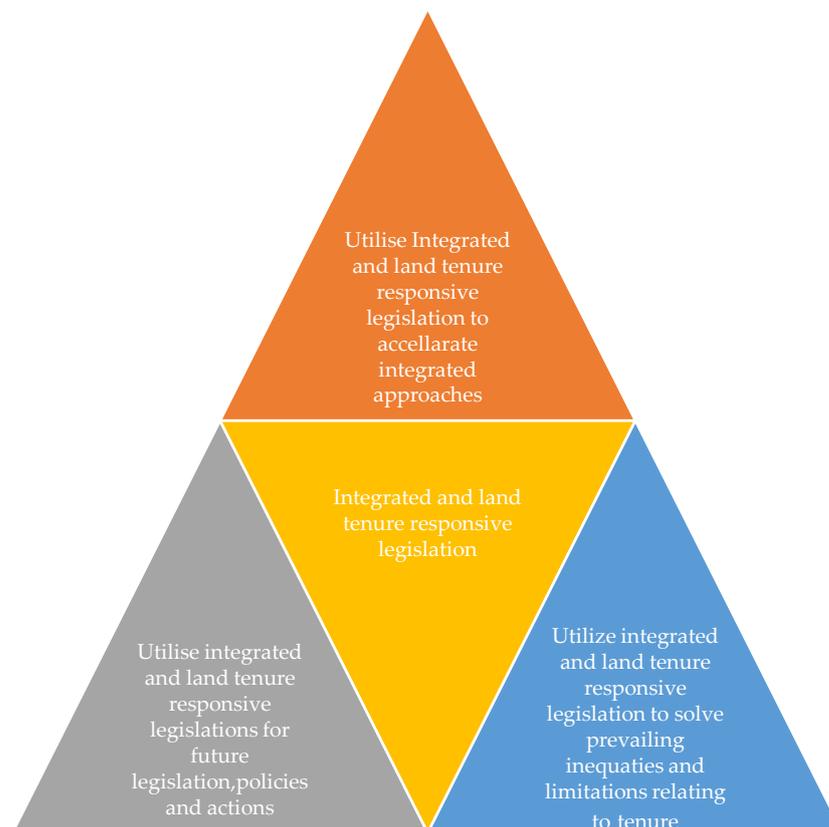
The Acts contain provisions for multi-sectoral ministerial and district-level committees, institutional collaborations, processes, procedures, and stakeholders, but little show at the local community levels. Achieving institutional improvements in structure and, consequently, the actions depend on the prevailing legislation. Some institutional gaps are due to the existing legislation needing more precision and clarity. Clarity, precision, and as much certainty as possible are due qualities of effective legislation. Legal precision and clarity become more critical in multidisciplinary and interdisciplinary fields of action, research, and dependence on social learning, such as integrated management approaches [155,156]. According to our hypothesis, the limited responsiveness of the legislation has led to the limited adoption and effectiveness of integrated watershed management approaches. As a result, catchments with dynamic tenure miss an opportunity for integrated watershed management actions to improve land tenure responsiveness in plans and actions [8,19,92,150,157]. Property rights are linked to watersheds, and so the management [68,70,72]. Therefore, equally important is recognising the role of land tenure, especially private land tenure practices, with more individualised but unequal resource power and rights and insufficient public land tenure to maintain and supply sustainability goals, among other characteristics defining the public–private land tenure and property coexistence, as essential for holistic and responsive legislation.

#### 4.5. Conceptualizing for a Responsive Legislation to Integrated Watershed Management Amidst Land Tenure Dynamics

In this sub-section, we respond to the third research question identifying legislative remedies recommendable for responsive legislation.

Overall, an integrated watershed management and land tenure-responsive legislation would handle the complex integrated watershed management approaches. However, at the catchment levels, responsiveness pays attention to the public and private land tenure co-existence and complexities, along with other distinct land tenure system dynamics. Some foreseen complexities relate to mobilising, legislating, and administering private land tenures for ecocentric values, costly land acquisitions to supply human and nature needs, participatory supervision of public and private tenures, and legislation enforcement. The new legislation must also balance valued goods and services with intangible ones, land rights and responsibilities, and plots and landscape values while considering the physical place, related laws, social norms, and rights [71–73].

Therefore, an appropriate legislative framework is due, with at least a three-pronged effect, as summarised in (Figure 4). Here we envision the ‘new legislation’ ability to accelerate ‘integration’ and thus approach effectiveness, solve land tenure-related challenges and limitations prevailing, and enact other relevant legislations through monitoring and evaluation.



**Figure 4.** Conceptualized Application of Integrated and Land Tenure Responsive Legislation.

One of the ways to initiate a review of existing laws, enact new ones, or influence coherence among prevailing legislations is through the development of Model legislation or provisions. Model legislation would inform some uniformity and consistency necessary following the global adoption of integrated watershed management approaches extent, land tenure, environmental legislation variations and the transboundary and cross-sectoral nature of issues. This paper provides some ideas to inform the model legislation, especially following the indicators we applied in evaluating the prevailing legislation. Emphasis

should include providing appropriate definitions, principles, institutional frameworks, and hierarchies. Responsive legislation should recognize the interconnectedness of resources and the issues that enable responsive planning, budgeting, monitoring and evaluation. Catchments bear uniqueness; thus, jurisdictional applications accommodative of catchment uniqueness are essential. In that case, provide for landscape-based-land tenure rights. The aim is to provide for common but differentiated roles, duties, and benefits in land and other resource administration. For instance, the Uganda Mountains and Hilly Areas Regulations of 2000 contain such thinking. However, it is limited to mountainous and hilly areas and is not equally enforced uniformly in the whole country or enforced at most. To succeed at ensuring varied roles, tenure but common goals, elaborate assessment process, information management and decision making.

## 5. Conclusions

Integrated watershed management approaches to ensure sustainable resources management and governance, especially on a defined spatial scale, informally date back centuries but formally to at least four decades ago. Concept refinement continues through criticism, research, and practice. Experiences drawn from implementing integrated watershed approaches draw our attention to the role of land tenure and institutional dynamics as some of the limiting factors to the possibility of achieving integrated watershed management goals. This paper answers the three research questions approaching them in two parts. First, by providing comprehensive coverage of the land tenure and integrated watershed management linkage from literature and complementary field experiences of topics, we need to understand better, such as public–private land tenure co-existence in catchments and the prevailing land tenure effect on integrated watershed management approaches. Second, the section provides a knowledge basis for a move towards integrated and responsive legislation. Third, the significance of understanding the land tenure dynamics provides information about needed modifications in mobilizing private lands and consolidating strategies for private voluntary actions, land acquisitions, restrictions, incentives, and other measures for sustainability through integrated watershed management [144]. The second part of the paper also evaluates the responsiveness of relevant legislation in the context of dynamic land tenure to integrated watershed management approaches. The results indicate a low to moderate responsiveness by the prevailing legislation to integrated watershed management amidst the dynamic land tenure. As such, achieving a resources management system that respects land tenure rights while serving both human and environmental goals equitably across landscapes, a move beyond policy statements and sectoral legislation lacking in responsiveness is due. The suggestion applies to the case study areas where integrated watershed management approaches are a policy statement and action decades past and dependent on a sectoral legislative framework. Moreover, according to the UN report of 2021, several other regions in the global south need to improve on integrating and implementing integrated watershed management approaches [6], a situation that would benefit from legislative reform. We suggest a move to integrated watershed management and tenure-responsive legislation. However, we are limited in elaborating in a detailed manner the significance of such legislation as such future research could explore the legal significance and feasibility of our recommendation for integrated watershed management approaches and land tenure responsive legislation.

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