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Mainstreaming climate adaptation into sectoral policies in Central Africa: Insights from Cameroun.

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Abstract

While considerable advances have been made in mainstreaming climate adaptation into sectoral policies in most regions across Africa, little is known about Central Africa (CA) even though the sub-region has enormous potentials to mitigate greenhouse gas emissions through the Congo basin forest. This paper presents an in-depth analysis of the progress made in mainstreaming climate adaptation into sectoral policies in CA based on insights from Cameroun. To achieve this, 30 strategic policy documents published by the government of Cameroun covering different aspects of climate adaptation were exploited. Additional information was obtained from interviews with 27 stakeholders working in relevant government ministries/institutions and international organizations. Results show that significant progress has been made to mainstream climate adaptation into the forestry and energy sectors. This has been facilitated by the putting in place of national policies that consider climate change impacts and mitigation/adaptation in these sectors. Meanwhile, little progress has been recorded in the water and agricultural. The lack of progress in these sectors can be attributed to the absence of national policies that take into account climate change impacts in these sectors. Overall results show that the National Adaptation Plan of Action has played a key role in enhancing the mainstreaming of climate adaptation into sectoral policies in Cameroun. Notwithstanding the progress recorded, many obstacles such as the lack of human and financial resources still exist. Stakeholders proposed a series of potentially useful solutions to tackling obstacles hindering cross-sectoral mainstreaming initiatives. This paper contributes to contemporary debates on the extent to which adaptation mainstreaming is happening at national level in sub-Saharan Africa, and reveals the obstacles that need to be addressed in order to sustain this initiative in CA and other regions of the continent.

Keywords: Climate change; mainstreaming climate adaptation; sectoral policy; Cameroun; Central Africa

1 Introduction

The challenge of adapting to climate change and variability is not new given that people and communities have lived with climate variability for a long time, and have developed management

36 decisions to cope with it (Berrang-Ford *et al.*, 2011). However, the ways in which societies have adapted
37 to date, and the range of adaptation mechanisms, may not be sufficient to deal with the new challenges
38 posed by climate change such as increased extreme flood events (Levine *et al.*, 2011). Societies most
39 vulnerable to climate change are also those that are very sensitive to climate perturbations and least able
40 to adapt to a changing climate and other stressors including development pressures (Levine *et al.*, 2011).

41 While there is still uncertainty on the magnitude of climate change, there is high confidence that
42 the global climate is changing (Dessai *et al.*, 2013). Therefore, better informed and more drastic
43 sequences of adaptation measures may be needed to substantially improve the living conditions of
44 communities. In fact, the need to adapt to climate change is now widely recognised as evidence of its
45 impacts on social and natural systems keep increasing and greenhouse gas (GHGs) emissions continue
46 unabated (Wise *et al.*, 2014). This has brought climate change adaptation to the forefront of most
47 scientific enquiries and sectoral policy negotiations (Tchakert and Dietrich, 2010; Dessai *et al.*, 2013;
48 Ampaire *et al.*, 2017; Epule *et al.*, 2017; Okpara *et al.*, 2018).

49 The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as “adjustment in
50 natural or human systems in response to actual or expected climatic stimuli or their effects which
51 moderates harm or exploits beneficial opportunities” (IPCC, 2007, p. 869). The urgency associated with
52 adaptation is how it can be facilitated, supported, planned and sustained.

53 Although sectoral adaptation planning may be constrained by uncertainties inherent in both
54 climatic and non-climatic drivers, the timing of impacts and their spatial distribution and adaptation
55 plans will generally be accepted if society can benefit from such plans, including the reduction of climate
56 impacts (Wilby *et al.*, 2010). There are many scales and actors involved in sectoral adaptation processes
57 ranging from individuals in response to climate extremes to governments on behalf of society,
58 sometimes in anticipation of change or in response to a socio-natural hazard. Adaptation therefore
59 involves the interdependence of agents through their relationships with each other, with the institutions
60 in which they reside, and with the resource base on which they depend (Adger, 2003). Institutions play
61 a key role in climate adaptation because understanding the institutional dimensions of climate change
62 adaptation is crucial to mainstreaming climate adaptation into sectoral policies (Cuevas, 2018).

63 To meet the challenges of promoting inclusive and sustainable development while adapting to
64 the impacts of climate change and mitigating against further warming in line with the Paris Agreement
65 and the Sustainable Development Goals (SDGs), there is a need to mainstream climate adaptation into
66 all sectors and institutions/organs of government (England *et al.*, 2018). This is especially so in regions

67 where people, communities and sectors face the greatest climate-related threats (MEA, 2005) under
68 conditions of institutional weaknesses (Jones *et al.*, 2009).

69 Whilst considerable progress has been made in mainstreaming climate adaptation into sectoral
70 policies in East and West Africa (Lauer and Eguavoen, 2016; Alhassan and Hadwen, 2017; Ampaire *et*
71 *al.*, 2017; Pardoe *et al.*, 2017), little is known about the Central Africa (CA) sub-region (i.e. Cameroun,
72 Central Africa Republic, Chad, Equatorial Guinea, Gabon, Congo, Democratic Republic of Congo).
73 Paradoxically, this sub-region is home to the Congo basin forest, which is the second largest rain forest
74 in the world after the Amazon (Tiani *et al.*, 2015; Bele *et al.*, 2011). A recent study has revealed that the
75 Congo basin harbors the most extensive tropical peatland complex at ca. 145,500 km² with an estimated
76 30.6 Petagram (Pg) of carbon stored in these peatlands (Dargie *et al.*, 2017). The sub-region offers
77 enormous potentials for global initiatives to mitigate climate change through different forest
78 conservation initiatives and also to improve the livelihoods of people living in and around the Congo
79 basin (Brown *et al.*, 2011; Dargie *et al.*, 2018). However, the state of climate adaptation in the sub-
80 region is not known; and Ludwig *et al.* (2014) reported that out of 517 peer reviewed articles published
81 on regional climate adaptation initiatives in Africa, only 14 covered countries in this sub-region.

82

83 **2 Theoretical framework**

84 Mainstreaming involves the articulation of information, policies and measures into ongoing
85 development planning and decision-making to address climate change; considering that it is easier to
86 start with existing policies and practices, rather than creating new ones (Lebel *et al.*, 2012; Ayers *et al.*,
87 2014). Through this concept, climate risks can be easily incorporated into policy and practice to support
88 short and long-term development planning. The mainstreaming concept is not new given that it has been
89 used to address other global issues such as gender inequality, poverty alleviation, millennium
90 development goals, and HIV/AIDS (Kabeer, 2003; Lebel *et al.*, 2012). The concept is widely used in
91 climate adaptation is because climate change is a cross-sectoral challenge that poses significant risk to
92 many development sectors and hence cannot be addressed in isolation (Vincent and Colenbrander,
93 2018).

94 There are many benefits that can be derived from mainstreaming climate adaptation into sectoral
95 policies such as; increasing coherence and synergies across different sectors to achieve adaptation goals,
96 reducing duplication and cost of “adaptation” implementation, and minimizing the degree to which
97 adaptation policies contradict each other (Alhassan and Hadwen, 2017). The concept has been applied
98 to address climate adaptation in different sectors such as disaster management (Heazle *et al.*, 2013),
99 development issues (Sietz *et al.*, 2011; Ayers *et al.*, 2014; Lauer and Eguavoen, 2016), integrated water

166 semi-structured interviews with key stakeholders in relevant government ministries/institutions and
167 organizations working in partnership with Cameroun to mainstream climate adaptation into sectoral
168 policies.

169 Analysis seeks to ascertain whether mainstreaming climate adaptation was considered in the
170 strategic policy documents published by the government in the water, agriculture, forestry and energy
171 sectors aimed at addressing climate change. Mainstreaming is considered to occur when (i) climate
172 change adaptation/mitigation is mentioned in the policy document(s); and (ii) specific actions are
173 included to account for and enable the mainstreaming of climate adaptation. In this study, sectoral policy
174 refers to any initiatives or projects put in place by government aimed at mainstreaming climate
175 adaptation in water, agriculture; or mitigation goals in the forestry and energy sectors. Policy documents
176 highlighting sector-specific initiatives or projects put in place through the technical assistance of
177 development partners (e.g. World Bank, United Nations Development Program, World Conservation
178 Union, and Global Water Partnership) aimed at addressing climate change were also consulted.

179 Document analysis followed a systematic procedure with focus to examine how climate
180 adaptation/mitigation has been mainstreamed into sectoral policies since 1994 after the country ratified
181 the United Nations Framework Convention on Climate Change (UNFCCC). Systematic procedure
182 employed consists of searching and synthesizing research evidence on the state of knowledge on a given
183 topic or based on research questions, an approach that has previously been used mostly in health sciences
184 although it has started receiving significant attention within the climate science community (Grant and
185 Booth, 2009; Epule *et al.*, 2017; Okpara *et al.*, 2018).

186 Sectoral documents were systematically analyzed through “keyword searches” to identify and
187 isolate texts indicating specific climate-related problems and adaption actions. Keywords used include:
188 ‘climate/climatic change adaptation’, ‘drought’, ‘flood’, ‘mitigation’ ‘environmental protection’,
189 ‘environmental education’, and ‘climate change communication’. Keyword searches led to detailed
190 reading of selected documents to identify relevant details dealing with policy provisions, including the
191 range of initiatives and action plans proposed. A total of 30 policy documents including the National
192 Adaptation Plan of Action (NAPA) and the Growth and Employment Strategic Paper were included in
193 the review (Table 1). In total three documents were available from the water sector; one from the
194 agricultural sector; three from the forestry sector and five from the energy sector were reviewed. NAPA
195 was used to identify the specific adaptation actions each sector should focus on. Considering that
196 mainstreaming climate adaptation cannot occur in a vacuum, policy documents that facilitate the
197 mainstreaming of climate adaptation either directly or indirectly were also consulted targeting

198 specifically to understand; (i) how the government organizational structure has been re-configured to
199 accommodate climate change and environmental protection; (ii) how information related to climate
200 change is disseminated to the general public; (iii) how new academic departments have been created
201 and educational curriculum re-adapted to accommodate climate change and environmental education;
202 and (iv) how climate change adaptation is funded and the various constraints involved. In fact the role
203 of institutions and their configuration, information dissemination and education in enhancing climate
204 adaptation cannot be overemphasized.

205 To provide additional information not captured in the selected documents, analysis was
206 complemented by semi-structured interviews with stakeholders working in different capacities (13
207 government officials, 4 academics, 4 NGO experts, 2 civil society actors and 4 experts working with
208 international organizations) (Table 2). To identify potential interviewees, a broad inventory of
209 institutions responsible for mainstreaming climate adaptation/mitigation into sectoral policies either
210 directly or indirectly was carried out using two criteria; (a) function; and (b) knowledge and abilities.
211 The function criterion refers to institutions that are formally responsible for climate change issues and
212 include government departments that prepare policy, legal and regulatory documents in the area of
213 environment and climate change. The knowledge and abilities criterion refers to institutions that have
214 relevant knowledge and skills related to climate change. Contacts were established between the
215 researcher and permanent secretaries in the identified ministries/institutions. The permanent secretaries
216 then established links between the researcher and the different directors and staff in the
217 ministries/institutions responsible for mainstreaming climate adaptation policies in the different sectors
218 considered in this paper. The same approach was used to establish links between the researcher and staff
219 working with international organizations by first contacting the head of each organization; while the
220 lecturers interviewed during the study were contacted directly by the researcher. A snowball sampling
221 technique (Atkinson and Flint, 2001) was also employed to identify other interviewees.

222 This study was not aimed at investigating implementation effectiveness of sectoral policies on
223 the ground¹. The study was limited to Yaoundé the capital of Cameroun which is the seat of government
224 institutions where policies are developed. The interview questions were framed to cover the main issues
225 and sectors under investigation (agriculture and food security, water resources, energy, forestry) and all
226 interviewees were asked the same questions. Among the government officials interviewed, five were
227 selected from the Ministry of Environment, two from the Ministry of Energy and Water Resources, two
228 from the Ministry of Agriculture, two from the Ministry of Forestry, and one each from the Ministry of

¹ Policy implementation is considered in this study as a potential area for future research.

261 Furthermore, verification and certification in forest exploitation is compulsory in Cameroun and
262 the country has signed the Voluntary Partnership Agreement (VPA) of the European Union’s Forest
263 Law Enforcement, Governance and Trade (FLEGT) program and African Forest Law Enforcement and
264 Trade (AFLEG) (Savilaakso *et al.*, 2017; Tegegne *et al.*, 2017). The introduction of forest certification
265 schemes has led to positive changes in management practices and increased social and environmental
266 performance potential and could contribute to the sustainable management of forest resources in Central
267 Africa (Atyi *et al.*, 2013). It is reported that through such innovations in governance and cooperative
268 action among multiple stakeholders, the rate of deforestation have been reduced while at the same time
269 allowing continued economic growth (Chow *et al.*, 2013). Hence, protected areas help in climate change
270 adaptation by simultaneously reducing poverty, protecting biodiversity and ecosystems services, and
271 removing atmospheric greenhouse gases (Scarano 2017).

272 Cameroon is a member of two multilateral REDD+ initiatives: the Forest Carbon Partnership
273 Facility (FCPF) of the World Bank and the UN’s Collaborative Programme on Reducing Emissions
274 from Deforestation and forest Degradation in developing countries (UN-REDD) and through such
275 initiatives, several REDD+ projects are at the development or implementation stage in Cameroon
276 (Tegegne *et al.*, 2017).

277 Therefore, by putting in place a national policy for sustainable forest management, creating many
278 protected areas, signing the VPA, FLEGT and AFLEG cooperative agreements and joining several
279 multilateral initiatives such as REDD+, the government of Cameroun has directly or indirectly
280 mainstreamed climate adaptation into the forestry sectoral policies. Through such initiatives, Cameroun
281 has contributed to significantly reduce the rate of illegal logging and deforestation and contributed to
282 sequester significant amounts of carbon which are efforts aimed at mitigating global climate change
283 using forest conservation.

284 Other actions that indicate adaptation mainstreaming in this sector include the “Operation Green
285 Sahel” that was launched in 1980 as a strategy to stop the advancement of the desert, prevent and reduce
286 soil degradation in arid and semi-arid areas and restore degraded lands. Although this initiative was
287 stopped due to economic crisis, it was re-launched in 2008 and aims to plant more than 10 million trees
288 across the country (MINEP, 2004). This initiative is considered by government officials as part of
289 Cameroun’s contribution to mitigate climate change and is fully funded by the Public Investment budget
290 since 2008 (MINEPDED, 2015).

291 Other forest related policies that draw from the National Adaptation Plan of Action include; (i)
292 the putting in place of a forest fire monitoring, prevention and early warning system; (ii) increase

293 scientific research activities to characterize the positive and negative effects of climate change on forest
294 ecosystems; (iii) support and reinforce the implementation of REDD+ initiatives by involving the local
295 communities; and (iv) develop social indicators to monitor the well-being of the population living
296 around protected areas.

297 At the sub regional level Cameroun is a founding member of the Forestry Commission of Central
298 Africa (COMIFAC), member of the Congo Basin Forest Partnership (CBFP), and the Conservation and
299 Rational use of Central Africa Forest Ecosystems (ECOFAC) (MINEP, 2004). The different initiatives
300 indicate that Cameroun has made significant progress aimed at mainstreaming climate
301 adaptation/mitigation in the forest sector.

302

303 **4.1.2 Energy Sector**

304 The country focus in this sector is mainly on the development and modernization of the energy
305 sector. The main climate adaptation policy mainstreamed in the energy sector revolves around the
306 promotion of the use of renewable energy and enhancing energy efficiency in the country; and to also
307 facilitate the use of renewable energy within the context of expanding rural electrification (ARSEL,
308 2014). Under this policy, several rural electrification projects using renewable energy sources have been
309 executed in the country (Kenfack *et al.*, 2016). Since the 2012 financial year, the importation of solar or
310 wind energy installation and operating equipment are exempted from value added tax (ARSEL 2014).
311 This policy is intended to encourage the importation of renewable energy equipment as part of the
312 national energy policy and strategic action plan aimed at increasing the resilience of Cameroun's energy
313 sector to climate change and variability (MINEE, 2006). Renewable energy can enhance climate change
314 adaptation by providing energy to power early warning systems, telecommunication systems, health
315 clinics and portable water systems in rural areas (Ley, 2017).

316 Other policies in the energy sector are articulated in NAPA and include; (i) diversification of
317 energy sources in the context of climate change; (ii) construction of new hydropower dams and
318 rehabilitation of existing ones; (iii) encourage the use of renewable energy and enhancing energy
319 conservation through new technologies. In fact, the role of hydropower production in mitigating
320 greenhouse gas emissions cannot be overemphasized, which can explain why many hydropower projects
321 are under execution in Cameroun including; Lom-Pangar dam, Mvele hydro-power project, Mekin
322 hydro-power project, Bini à Warak hydro-power project, and Ngodi hydro-power (MINEE, 2015;
323 ARSEL, 2017). This vision is also outlined in the GESP in accordance with the recommendation of the
324 World Bank. The strategy is to stimulate the development of hydropower to lower electricity cost, reduce
325 carbon emissions and insulate sub-Saharan African countries from increases in the price of fossil fuels

326 (World Bank, 2009). Such policy initiatives are also geared towards reducing the country's carbon
327 footprint through the use of renewable energy (World Bank, 2009). Hydropower dams reduce the
328 impacts of climate change on water resources because regulated basins with large reservoirs are more
329 resilient to water resources changes, less vulnerable to climate change and also act as storage buffer
330 against climate change (Berga 2016).

331 In the area of biomass consumption, Cameroun is engaged in a process to freely distribute
332 improved fuel-efficient cooking stoves to local communities to reduce pressure on the cutting down of
333 trees for firewood (MINEE, 2015). This project is financed by Carbon revenues and is facilitated in the
334 country by CO2balance and the African Centre for Renewable Energy and Sustainable Technology
335 (ACREST) (Muthiah, 2014). Such initiatives also enhance climate change adaptation by simultaneously
336 reducing poverty, protecting biodiversity and ecosystems services, and removing atmospheric
337 greenhouse gases (Scarano, 2017). Our analysis show that substantial progress has been made to
338 mainstream climate change adaption in the energy sector in Cameroun.

339

340 **4.1.3 Water sector**

341 The law governing the water sector adopted in 1998 recognizes water as a national good that is
342 not infinite and needs to be protected and managed efficiently. In the absence of a national water policy
343 in Cameroun, integrated water resources management (IWRM) is recognized as a starting point to
344 mainstream policies on the sustainable management of water resources under a changing climate
345 (MINEE, 2009). The vision in the IWRM action plan is to; (i) make water accessible to all citizens; (ii)
346 preserve natural ecosystems which are dependent on water; (iii) increase agricultural production and
347 reduce food insecurity through the efficient management of water resources (MINEE 2009; GWP,
348 2010).

349 However, to improve the sustainable management of water resources in a changing climate, the
350 goals set out in NAPA that mainstream climate adaptation in the water sector include; (i) reduce socio-
351 economic vulnerability to climate change through the rational management of water resources; (ii)
352 reduce the exposure of the population to health risk posed by climate change by upgrading urban
353 drainage infrastructure; (iii) continue to collect relevant hydro-meteorological data that can enhance
354 research and pursue capacity building in research institutions to understand the occurrence of extreme
355 events and how they can be predicted in real time; (iv) continue to fight against desertification and
356 develop water harvesting infrastructure in arid areas; (v) put in place an early warning and health
357 surveillance system for water borne diseases; (vi) reinforce the treatment and prevention of water-related
358 diseases that may become recurrent as a result of climate change.

359 At the regional level, Cameroun has adhered to numerous policies, strategies and plans that
360 promote the mainstreaming of climate adaptation in the development and management of water
361 resources including; United Nations Framework Convention on Climate Change (UNFCCC), African
362 Water Vision, African Union Sharm el-Sheikh Declaration on water and sanitation, strategic framework
363 for water security and climate resilient development, regional water policy of Economic Community of
364 Central African States (2009), the financing strategy for the water sector in Central Africa (2010), the
365 2025 development vision of the Lake Chad Basin Commission (LCBC), the Lake Chad Basin Strategic
366 Action Program (2008), the Congo-Oubangui-Sangha River Basin Strategic Action Plan. The
367 Government of Cameroun has also adhered to numerous international agreements in the area of water
368 security and climate resilient development all aimed at mainstreaming climate adaptation in the water
369 sector (GWP 2014). Yet, adaptation has not been mainstreamed in this sector due to numerous constrains
370 enumerated in section 4.2 below.

371

372 **4.1.4 Agricultural Sector**

373 A national strategy for the development of agricultural sector was put in place in 2006. Although
374 mainstreaming climate adaptation is not explicitly considered in that policy document, the main goals
375 in the strategic plan that are relevant to climate adaptation include; (i) to develop a sustainable
376 agriculture and food supply system; (ii) enhance the sustainable management of natural resources; (iii)
377 develop adapted financial mechanisms in the sector; (iii) manage the risk of food insecurity; and (iv)
378 develop an adapted institutional framework for the agricultural sector.

379 Through NAPA, Cameroun intends to mainstream climate adaptation in the agricultural sector
380 to make its agricultural system resilient to climate change and improve the adaptive capacities of the
381 various actors in this sector. To achieve these goals, the following policies are envisaged to be
382 mainstreamed in the farming sub-sector; (i) provide weather and climate information services to rural
383 communities through community radios to help farmers plan farming activities; (ii) improve farming
384 systems by enhancing agronomic research and put in place a national strategy to disseminate research
385 results; (iii) promote adaptation process through the use of improved crop varieties, improve soil
386 management for nutrient and water conservation and promote the use of fertilizer to increase yields; (iv)
387 agricultural diversification to reduce vulnerability by promoting agroforestry in the different agro-
388 ecological zones; (v) free distribution of farm inputs to smallholder farmers; and (vi) update the land
389 tenure policy to address gender imbalance to ensure that women can easily access land for agricultural
390 purposes.

391 In the agro-pastoral sub-sector; (i) provide weather and climate information services to
392 pastoralists using community radios; (ii) rehabilitate existing weather stations to observe the evolution
393 of climate and its impact on livestock; (iii) develop community water points for cattle and put in place
394 village committees to manage these water points; and (v) develop an agro-pastoral policy that takes into
395 account climate adaptation.

396 In the fishery sub-sector; (i) provide weather and climate information services to the fishermen
397 using community radios; (ii) improve the management of fishing and aquaculture activities around dams
398 to improve the exploitation of different fish species to avoid scarcity; and (iii) promote the creation of
399 community fish ponds and develop new techniques to improve the treatment, drying and conservation
400 of fishery products. All these initiatives are aimed at enhancing adaptation to climate change and show
401 that country has good intentions to mainstream climate change adaptation in the agricultural sector.

402

403 **4.2 What are the constraints impeding adaptation mainstreaming?**

404 Notwithstanding the substantial that have been made by Cameroun to mainstream climate
405 adaptation into sectoral policies, majority of the stakeholders interviewed recognised that there are still
406 numerous challenges that impede the mainstreaming initiative in the country. Generally, information
407 about the impacts of climate change is not easily accessible from the general public. Analysis revealed
408 also that collaboration among government institutions, NGOs and the local communities is very limited
409 (UNDP, 2010).

410 In the area of communication, the government recognizes that despite many communication
411 channels put in place, climate information is generally insufficient especially at the regional and local
412 levels and not well coordinated given that local authorities are not well informed (MINEPDED, 2015).
413 Brown and Sonwa (2015) also reported that, there is lack of information on climate change adaptation
414 among government officials working at the regional and sub-regional level thus limiting their capacity
415 to help the local communities to gain access to climate information. This lack of information by the
416 general public has been attributed to a lack of government policy to enhance the dissemination of climate
417 information to the general public (Egan, 2013). For example one stakeholder lamented that many
418 websites created to provide information to the general public are not regularly updated and access to
419 internet is still very low and costly. Furthermore, lack of logistical support, insufficient information and
420 training among journalists discourage private media organs from reporting issues related to climate
421 change (Tiani *et al.*, 2015).

422 Even with the existence of relevant academic departments in some universities in the country,
423 during the interviews, many stakeholders were frustrated that most climate impact research is conducted

424 in foreign institutions. They lamented that although such research may be recognized globally because
425 it is published in peer reviewed journals, it may lack policy uptake because it may fail to address priority
426 areas pertinent to policy makers in Cameroun. Stakeholders in the academia also expressed frustration
427 on the lack of resources and relevant climate data needed to carryout impact studies. They also decried
428 the absence of collaboration between scientists and policy makers.

429 Even though the government has elaborated a national strategy to integrate courses/modules and
430 training programmes on climate change into formal educational systems, environmental education is
431 absent in the curriculum of teachers training colleges in Cameroun (MINEPDED, 2012). Consequently,
432 teachers lack the capabilities to train pupils/students in the area of climate change. A similar situation
433 has been observed in journalism training schools which limits the capacity of journalists to report
434 relevant climate issues (Tiani *et al.*, 2015).

435 Although the country is well placed to harness available adaptation funding, a co-ordinated
436 climate change adaptation strategy is needed to ensure that sovereign development projects and climate
437 adaptation projects are not conflated and therefore render ineligible for their separate respective funding
438 streams (Egan, 2013).

439 Some stakeholders were of the opinion that, the fragmented nature of institutions involve in
440 climate issues sometimes creates instances of overlap and misinterpretation of rules by different
441 institutions resulting to conflict and power struggle among stakeholders. According to them, such
442 situations could lead to a delay in the execution of pilot projects put in place to facilitate climate
443 adaptation mainstreaming into sectoral policies.

444 Most stakeholders in government ministries decried the absence of resources including basic
445 working materials such as computers, absence of sufficiently trained personnel and financial resources.

446

447 **4.3 What steps have been put in place to address inherent constraints aimed at** 448 **facilitating climate adaptation mainstreaming across different sectors?**

449 **4.3.1 Institutional Reforms**

450 Generally, institutions and their configurations play an important role in mainstreaming
451 government policies (Koetz *et al.*, 2012). In the area of climate adaptation, previous research has shown
452 that institutional arrangement can significantly facilitate the mainstreaming of climate adaptation into
453 sectoral policies (Mubaya and Mafonguya, 2017). Considering this, efforts by the government of
454 Cameroun to include climate change into major policy agendas began in 1994 after ratifying the
455 UNFCCC by creating the Ministry of Environment and Forestry. This ministry was later split into two
456 to create the Ministry of Forestry (MINFOF) and the Ministry of Environment and Nature Protection

457 (MINEP) in 2005, later renamed Ministry of Environment, Nature Conservation and Sustainable
458 Development (MINEPDED) in 2011. This ministry is responsible for multi-sectoral policy development
459 and implementation in the areas of climate change and environmental protection. Presidential decree N°
460 2009/410 created and organized the National Observatory on Climate Change. The observatory is
461 responsible for directing climate change impact studies, adaptation research, policy advice, information
462 sharing, and to support national capacity development in this area.

463 Other institutions that support climate change adaptation/mitigation include the creation,
464 organization and functioning of the Steering Committee to reduce emissions from deforestation, forest
465 degradation, sustainable management and conservation of forest (REDD+) by decree N° 103/CAB/PM.
466 The Committee is responsible for the formulation of proposals for REDD+ strategic action plans,
467 develop selection criteria for REDD+ projects, evaluate REDD+ pilot project proposals, promote
468 REDD+ activities and validate the work of the National Technical Secretariat. In compliance with
469 UNFCCC recommendation, the “Cellule National des Changement Climatiques” (CNCC) was created
470 in the MINEPDED. The goals of CNCC include the creation of a greenhouse gas (GHG) inventory,
471 establishing adaptation measures, implementing an information system and database, designing sectoral
472 projects addressing priority climate actions and evaluating climate change impacts and policies
473 (Nachmany, 2015).

474

475 **4.3.2 Information dissemination**

476 Under international binding treaties, Cameroun was not expected to prepare a NAPA (UNDP,
477 2010) as it is not on the list of Least Developed countries (LDCs) but the country opted to do so in
478 partnership with UNDP. Since 2005, the country has prepared and adopted three National
479 Communications (NCs) on Climate Change (MINEPDED 2015).

480 According to the stakeholders interviewed, the government of Cameroun and her partners
481 acknowledge that the media can influence the perception and attitude of the general public regarding
482 environmental issues especially climate change and as such, many communication channels have been
483 created for this purpose. Dedicated media organs such as Radio Environment was created by the World
484 Conservation Union in Yaoundé in partnership with the government although it does not cover the whole
485 country. Another stakeholder articulated that a network of community radios have been created across
486 the country through the help of UNESCO to facilitate the broadcast of climate information in local
487 languages. Furthermore, UNESCO organizes regular training sessions for local journalists managing
488 these community radio to train them on how to produce and broadcast climate information. Other
489 communication channels that have been put in place to facilitate access to climate information include;

490 (i) monthly magazine and weekly newsletter of MINFOF; and (ii) many weekly and bi-monthly
491 programs run by Cameroon Radio Television (CRTV) (UNDP, 2010).

492

493 **4.3.3 Education and Training**

494 The government of Cameroun in partnership with UNDP, has elaborated a national strategy to
495 integrate courses/modules and training programmes on climate adaptation and environmental protection
496 into the formal educational systems (primary, secondary and tertiary) (MINEPDED, 2012). According
497 stakeholders at the Ministry of Environment, the elaboration of this strategic policy document ushered
498 in the inclusion of environmental education into the national education curriculum. Since the adoption
499 of this policy, environmental education has become a regular subject taught in primary and secondary
500 schools across the country (Nchia et al., 2017). Many stakeholders interviewed were unanimous that
501 there was a functional department of Hydrology and Climatology at the University of Maroua, a
502 laboratory of environmental modelling and atmospheric physics hosted by the Physics department in the
503 University of Yaoundé I and a faculty of agronomy and agriculture sciences in the university of Dschang
504 where research on climate change impacts and adaptation are conducted to enhance the mainstreaming
505 initiative.

506

507 **4.3.4 Adaptation Financing**

508 Scientific analyses have emphasize the significant financial resources and technological support
509 needed to address Africa's current adaptation deficit (Niang et al., 2014). As part of the engagement to
510 fulfil this obligation, multiple climate adaptation projects are currently under execution in Cameroun
511 with most projects aimed at facilitating the mainstreaming of climate adaptation into different sectoral
512 policies (UNDP, 2010). Other projects are in the areas of forest, energy, mangroves, watershed
513 management and developing climate scenarios (Crawford et al., 2011).

514 Examples of projects that have been executed in Cameroun include; (i) the Africa Adaptation
515 Project and the objective was to strengthen institutional capacities, enhance existing experiences so that
516 climate adaption could easily be mainstreamed into different sectoral policies and was funded by the
517 Japan International Cooperation Agency (JICA); (ii) the Africa Adapt Knowledge Sharing Innovation
518 project which was aimed at strengthening the adaptive capacities of small farming communities jointly
519 funded by the Department for International Development (DFID) and the Natural Environment Research
520 Council (NERC) United Kingdom; and (iii) the Climate Change Adaptation in Africa (CCAA)
521 programme which was aimed at establishing a program on vulnerability and adaptation to climate
522 change in Africa and was co-financed by the International Development Research Centre (IDRC) and

523 the DFID-UK. As a member of the Lake Chad Basin Commission (LCBC), Cameroun has also
524 benefitted from another project entitled “Lake Chad Sustainable Development and Support Program”
525 financed by the Africa Development Bank. Since the approval of Cameroun’s REDD+ Readiness Plan
526 (RPP) in 2013, it has benefitted from a readiness grant of USD3.6 million since 2013 (Nachmany *et al.*,
527 2015).

528

529 **4.4 Stakeholders’ recommendations**

530 Despite the difficulties expressed by stakeholders that hinder the mainstreaming of climate
531 adaptation into the water, agriculture, energy and forestry sectoral policies, proposals were made that
532 according them can fast-track the mainstreaming process.

533 In the area of research more than half of the stakeholders interviewed were of the opinion that;
534 while searching for ways to facilitate the mainstreaming of climate adaptation into different sectoral
535 policies, the government should consider the allocation of financial resources to country-based
536 institutions. They argued that such initiatives have the potential to increase the research output from
537 country-based institutions, directly address the needs of the policy makers, increase collaboration
538 between researchers, policy makers, and local communities and could help to upgrade research facilities
539 in the beneficiary institutions and enhance capacity building in those institutions.

540 Other stakeholders cautioned that policy makers should encourage researchers to carry out long-
541 term climate impact studies which are useful for mainstreaming policies aimed at long-term climate
542 resilient development instead of concentrating on short time frames guided by politics and immediate
543 development priorities; considering that the most severe impacts of climate change may become visible
544 only in the long-term.

545 Considering the significant deficit in the number of climate scientists in Cameroun, many
546 stakeholders interviewed proposed that; to raise awareness among pupils and students and encourage
547 them to develop interest in climate science, the government in partnership with development partners
548 could put in place a strategy to install simple weather stations in schools across the country. According
549 to them, installing such weather equipment in schools have the potential to arouse curiosity among pupils
550 and students thereby encouraging them to develop interest in climate science which could reduce the
551 deficit in climate scientists in the long term.

552 To reduce the communication gap and make climate information more accessible to the general
553 public, some stakeholders interviewed proposed that the government and other partners could put in
554 place different categories of monthly/annual prizes to compensate local media organizations and
555 journalists that run regular programmes or report issues on climate change and environmental protection.

556 Stakeholders also proposed that training workshops should be organized with local stakeholders such as
557 parliamentarians, mayors, women group leaders, village leaders and faith leaders who have the capacity
558 to mobilise and influence the local population to train them on climate issues given that this group of
559 people can easily disseminate climate information to the local communities if there are sufficiently
560 informed.

561 In the area of adaptation financing, stakeholders articulated that since most government
562 ministries/institutions directly involved with climate issues have less financial autonomy to directly
563 mainstream climate adaptation into long-term development plans at different sectoral levels; specialized
564 units could be created in influential ministries responsible for finance and economic planning. They
565 argued that the creation of such units in those influential ministries may fast-track the mainstreaming of
566 climate adaptation into the country's long term development plans. However, it was cautioned that for
567 such plans to be successful, there is need to train more climate scientists to take up such roles in public
568 administration.

569

570 **5 Conclusions**

571 The main objective of this paper was to examine to what extent climate adaptation has been
572 mainstreamed into the water, agriculture, forestry and energy sectors in the Central Africa sub-region
573 with particular focus on Cameroun. To answer the over-arching research question, the strategy adopted
574 was an in-depth qualitative method involving a systematic review of strategic policy documents
575 published by the Government of Cameroun. This technique was complemented by semi-structured
576 interviews with key stakeholders in relevant government ministries/institutions and organizations
577 working in partnership with Cameroun to enhance the mainstreaming of climate adaptation into sectoral
578 policies.

579 Results reveal that significant progress has been made in mainstreaming climate adaptation in the
580 forestry and energy sectors facilitated through different national policies, legislation and strategic action
581 plans put in place by the government. In addition, relevant policies have also been complemented by
582 other policy incentives elaborated in the National Adaptation Plan of Action. In the absence of strategic
583 policy documents that mainstream climate adaptation in the water and agricultural sectors, progress has
584 been registered in these sectors through the National Adaptation Plan of Action. However, it is thought
585 that putting in place national policies that take into account climate change impacts in these sectors will
586 facilitate the mainstreaming initiative in these sectors.

587 Analysis complemented by stakeholder interviews indicate that there are still many obstacles such as
588 the lack of human and financial resources that need to be addressed to enhance climate adaptation
589 mainstreaming especially in the agriculture and water resources sectors.

590 Although institutions such as the Ministry of Environment, Sustainable Development and Protection of
591 Nature and the National Observatory for Climate Change that have been put in place to facilitate the
592 mainstreaming of climate adaptation into sectoral policies, cross-sectoral coordination is still lacking.
593 However, it is hoped that projects funded by development partners such as REDD+ initiatives will
594 allocate part of their funding for capacity building so that experts can take up leadership roles aimed at
595 enhancing cross-sectoral climate adaptation mainstreaming in the country.

596 Considering that our document analysis showed that most climate adaptation mainstreaming are taking
597 place mostly at the national level, Cameroun needs to implement effective “cross-sectoral”
598 decentralization strategies so that personnel from regional and local institutions can benefit from training
599 and resources from different climate adaptation initiatives.

600 Many initiatives such as; (i) the putting in place of a national policy for sustainable forest management,
601 (ii) creation of many protected areas, (iii) signing the VPA, FLEGT and AFLEG cooperative agreements
602 and (iv) joining several multilateral initiatives such as REDD+ in the forest sector; and (i) promoting
603 the use of renewable energy and the putting in place of a national policy to enhance energy efficiency,
604 (ii) the construction of many dams for hydro-power generation in the energy sector and other sectoral
605 policies elaborated in the National Adaptation Plan of Action; indicate that mainstreaming climate
606 adaptation into sectoral policies is effective in Cameroun. Such initiatives are relevant to other countries
607 in the Central Africa sub-region especially those pursuing sectoral climate adaptation mainstreaming
608 initiatives.

609 Overall, this paper presents valuable insights on important policy and institutions advances that have
610 been put in place by Cameroun to facilitate and sustain climate adaptation mainstreaming into sectoral
611 policies as a response to climate impacts and also in compliance with international bilateral agreements
612 signed under the United Nations Framework Convention on Climate Change.

613

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620

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Document Title and type	Sector	Source and year
Forest code 94/01/1994 to lay down forestry, wildlife and fisheries regulations (policy document)	Forestry	MINEP (1996)
Plan National de Gestion de l'Environnement (policy document)	Environment	MINEP (1996)
Plan d'Action National de Lutte Contre la Désertification Vol I & II (policy document)	Environment	MINEP (1996)
Cameroon - Forest and Environment Sector Program Project	Forestry	MINEP (2004)
Stratégie national de communication sur l'adaptaton aux changements climatiques (policy document)	Communication	MINEP (2005)
Plan du Développement du secteur Électricité (policy document)	Energy	MINEE (2006)
Strategie de developpement du secteur rural (policy document)	Agriculture	MINADER (2006)
Plan d'action national de gestion integree des ressources en eau (PANGIRE) (policy document)	Water	MINEE (2009)
Decree 2009/410 of 10 December 2009 on the Creation, Organization and Operation of the National Observatory on Climate Change (policy document)	Institutional	MINEPDED (2009)
Cameroon civil protection status report (policy document)	Disaster management	MINATD (2009)
NAPA Projects Database (grey literature)	General	UNFCCC (2009)
Planning for Integrated Water Resources Management and Development in Cameroon (grey literature)	Water	GWP (2010)
Cameroon: Growth and Employment Strategy Paper (GESP) (policy document)	General	IMF (2010)
Supporting integrated and comprehensive approaches to climate change adaptation in Africa – Cameroon (grey literature)	General	UNDP (2010)
Review of current and planned adaptation action: Middle Africa (grey literature)	General	Crawford (2011)
Stratégie national de communication sur l'adaptaton aux changements climatiques (policy document)	Communication	MINEPDED (2011)
Loi N° 2011/022 portant régime d'électricite (policy document)	Energy	NA (2011)
Climate Change Financing and Aid Effectiveness Cameroun Case Study (grey literature)	Funding	Norrington-Davies (2011)
Elaboration of a strategy to integrate training on adaptation to climate change within the educational system of Cameroun (policy)	Education	MINEPDED (2012)
Decree No. 103/CAB/PM regarding the creation, organisation and operation of the steering committee for activities to reduce emissions from deforestation, degradation, sustainable management and conservation of forests, REDD+ (policy document)	Institutional	PM (2012)
Knowledge Management Strategy on Climate Change Adaptation for Cameroon (grey literature)	General	Egan (2013)
Readiness Preparation Proposal Cameroon (policy document)	Forest (REDD+)	MINEPDED (2013)
National Energy Efficiency Policy, Strategy and Action Plan in the electricity sector in Cameroon (policy document)	Energy	ARSEL (2014)
Understanding the Impact of Climate Change on Hydropower: The Case of Cameroon (grey literature)	Energy	Grijzen (2014)
Economics of Adaptation, Water Security and Climate Resilient Development in Africa	Water	GWP (2014)
Climate change legislation in Cameroon (grey literature)	General	Nachmany (2015)
Second National Communication on climate change (policy)	General	MINEPDED (2015)
Plan National d'Adaptation aux Changements Climatiques (policy)	General	MINEPDED (2015)
Republic of Cameroon Energy Sector Development Project	Energy	ARSEL (2017)

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813 Table 2: Summary of Stakeholder's interviewed by institution and type of organization

Structure	No of participants	Type of organization
Ministry of Environment, Sustainable Development and Protection of Nature	5	Government
Ministry of Energy and Water Resources	2	Government
Ministry of Agriculture and Rural Development	2	Government
Ministry of Forestry and Wildlife	2	Government
Ministry of Public Contracts	1	Government
Ministry of Scientific Research	1	Government
Universities	4	Academia
Commission des Forêts d'Afrique Centrale (COMIFAC)	2	NGO
Media	1	Civil Society
Independent Consultant	1	Civil Society
Centre for International Forestry Research (CIFOR)	2	NGO
German Technical Cooperation (GIZ)	2	IO
International Union for Conservation of Nature (IUCN)	2	IO

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815 ARSEL: Electricity Sector Regulatory Agency

816 ESDP: Energy Sector Development Project

817 IO: International Organization

818 GWP: Global Water Partnership

819 NGO: Non-Governmental Organization

820 IMF: International Monetary Fund

821 MINEPDED: Ministry of Environment, Sustainable Development and Protection of Nature

822 MINEE: Ministry of Energy and Water Resources

823 MINADER: Ministry of Agriculture and Rural Development

824 MINATD: Ministry of Territorial Administration and Decentralization

825 MINFOF: Ministry of Forestry and Wildlife

826 NA: National Assembly

827 PM: Prime Minister

828 RC: Republic of Cameroun

829 UNDP: United Nation Development Program

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Figure 1: Map of Africa showing the location of Cameroon

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