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研究課題名(和文) Vulnerability of pastoralists' livelihoods to climate change

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研究成果の概要(和文)：この研究は、ナイジェリアの遊牧民の気候変動に対する生計の脆弱性を分析し、環境変化に適応するための創造的な戦略を評価する。過去数十年の気象データを収集した。ナイジェリア中部地域において考えられるシナリオでは、気候変動だけでは遊牧民に極端な悪影響を与えないが、彼らは環境の変化によって引き起こされるより深刻な政治的、経済的困難に直面し、生活様式が妨げられる。2017年に参加型評価を実施し、2018年に68個の遊牧民集団に対してアンケート調査をした。最終年には、気候の脆弱性と受容性評価(CVCA)を行い、ローカルな情報を取得できた。気候変動と家畜への影響に関する遊牧民視点のナラティブも記録した。

研究成果の学術的意義や社会的意義

The scientific evidence and understanding of vulnerability of the pastoralists in central Nigeria will help us understand the root causes of violence and insecurity in the semi-arid and arid Africa that are concealed in the interaction between the environmental, socio-political and economic factors.

研究成果の概要(英文)：This research seeks to analyze the livelihoods vulnerability of pastoralists in Nigeria to climate change, and to assess their innovative strategies in adapting and mitigating the impacts. Meteorological data of the past few decades were collected. In the middle-belt of Nigeria, the possible scenario is that climate change alone may not have an extreme negative impact on pastoralists, but they may face more severe political and economic challenges caused by changes of the environment, which may hinder their way of life and adversely affect their social cohesion. In 2017, a participatory assessment was conducted. In 2018, a questionnaire survey was conducted on 68 pastoral groups. On the final year, Climate Vulnerability and Capacity Assessment (CVCA) was conducted to get more local details. Results of the questionnaires done was cross-checked in 2019. Narratives on pastoralists' perspective on climate change and its impacts on their livelihoods and livestock has been recorded.

研究分野：環境政策・環境社会システム

キーワード：Climate Change Vulnerability Pastoralist Africa Nigeria Adaptation Capacity Assessment Meteorological data

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1. 研究開始当初の背景

Africa is the continent with the highest vulnerability to climate variations, and agriculture is one of the most vulnerable sectors. Vulnerability in this sector is manifested through occurrence of extreme events such as increased drought, flood severity, intense storms, shifts in the timing and distribution of rainfall and warmer temperatures. There are secondary effects such as increased pest and disease pressure. Pastoralists face a number of challenges that constrain their livelihoods and stifle their ability to adapt to changes in the external environment. In Nigeria, despite the important role of pastoralism in supporting the local livelihoods and its contribution to national and regional economies, pastoral families face a lot of insecurities brought by the complex property right systems, political and economic marginalization, inappropriate development policies, increasing resource competition, and on top of these, the severe climate change (Fabusoro et al., 2008).

In central Nigeria where a large population of pastoral Fulani have migrated into and settled for over a century, their livelihood system depends mainly on the condition of their herds, which in turn, relies on the availability and quality of rangelands for grazing (Fu, 2013). The herd must have access to dispersed, ecologically specialized and seasonally varied grazing lands and watering holes to provide for the distinct foraging needs of different livestock species and to afford a margin of safety against the normally erratic pattern of rainfall (Nori et al., 2005). The health and wealth of the cattle herd depends largely on availability of, and access to, forage pastures and water.

Although pastoralists have lived with challenges of climate variability for millennia and they are known to be highly resilient to erratic weather and climate conditions, the unprecedented rate and scale of recent climate change is beginning to pose problems on them, especially in places like Nigeria where social, political and economic factors are inimical to their lifestyles. Apart from exposure to climate alterations, frequent conflicts arising from competition for common resources and land tenure system in central Nigeria has further positioned the Fulani pastoralists as a highly vulnerable group of people.

2. 研究の目的

This study seeks to analyse vulnerability of livelihoods of nomadic pastoralists in Nigeria to climate change, and the innovative strategies they have developed in adapting and mitigating the impacts. Innovative strategies will be required to improve the resilience of the pastoralists. The recent erratic rainfall situation and other climate variability necessitate this study to ascertain how vulnerable nomadic pastoralists are to climate change and what livelihoods adaptation strategy they have evolved to show resilience. The understanding of vulnerability of the pastoralists in central Nigeria will help us understand the root causes of violence and insecurity that are concealed in the interaction between the environmental, socio-political and economic factors.

3. 研究の方法

In the first year, the focus of the research has been put on literature review on vulnerability analyses and climate change. In 2017, a fieldwork of three weeks long was conducted in Nigeria and a participatory vulnerability and capacity assessment to climate change was executed. A questionnaire was designed and tested, enumerators

were trained and interview arrangements were made. Pastoralists were also instructed for detailed daily record of herding activities and cattle management. Despite the researcher could not visit Nigeria in 2018 due to political instability, the questionnaire survey was successfully conducted on sixty-eight pastoral groups through the earnest assistance by local researchers. The survey collected socio-economic data, movement history, climate change experience, land accessibility, cattle health management and adaptive strategy of pastoralists. The core pastoral group kept recording diary on daily grazing activity and cattle management for over a year. Meteorological data of 1950s to 2019 were collected and being analyzed. On the final year, a follow up fieldwork of three weeks was conducted. Results of the questionnaires was cross-checked. Narratives on pastoralists' perspective on climate change and its impacts on their livelihoods and livestock were further recorded.

4. 研究成果

Climate change and pastoralism

Climate change reduces available land for livestock production purposes at 350,000 hectares per annum as estimated by IPCC (2007). The Fulani pastoralists of Africa are one of the few groups of people that are actually knowledgeable and have taken decisive actions about climate change (Nori, 2007; Omotayo, 2003; Blench, 2001; Omotayo, 2010). The livelihood patterns of pastoral community hinge upon strategies that continuously adapt to a limited, highly variable and often unpredictable resource endowment (Davies and Nori, 2008). The range of strategies that pastoralists use results from the larger geo-political system. The adaptive capacity of pastoralists is what has made them so resilient throughout history and has enabled them to sustainably exploit their natural environment. Their adaptive management skills enabled them to create and maintain biodiversity in many environments of extraordinary natural beauty (Rutherford et al., 1999; Rahlao et al., 2008). Yet pastoral development over the past century has been characterized by the loss of this adaptive capacity, and the outcome has been a vicious cycle of impoverishment, resource depletion and environmental degradation, which further erodes their adaptation (Davies and Nori, 2008).

Pessimistic views of pastoralism in the face of climate change are particularly rife in Africa south of the Sahara, where food insecurity is widespread and where many pastoral communities are regularly confronted with drought, which is said to be increasing. Scientific predictions and computer simulations suggest that in the short term the Sahel might actually benefit from climate change, through a greening of the Sahel and southern Sahara. Rather than facing meteorological drought, many pastoralists may be faced with a form of agricultural drought, a phenomenon that is evidently man made and is influenced by poor policy and mismanagement (Nori and Davis, 2007). In reality, climate change will not favor pastoralists if they do not recover the ability to adapt. Policies and investments frequently favor crop growers over livestock keepers, particularly in the drylands where crops are being made more and more resistant to drought. The land rights of crop growers are usually more secure than those of livestock keepers, and the tendency over the past few decades has been incursion of cultivators into grazing lands (Fabusoro et al., 2008). Even if the projected "greening of the Sahara" does take place, under the current conditions it is likely to be crop growers that benefit at the expense of pastoralists.

Different Scenarios of climate change impacts on pastoralism

Observed climatic changes show that overall Africa has warmed by 0.7°C over the twentieth century, which is a 0.05°C warming per decade. Projected warming for Africa ranges from 0.2°C per decade (low scenario) to more than 0.5°C per decade (high scenario) (Hulme et al., 2001; IPCC, 2007). UNOCHA (2009) illustrated three possible scenarios on the current and potential impacts of climate change on pastoralists in Central and East Africa. They represent well the ongoing debate on the possible impacts of climate change on pastoralism.

The first scenario is more reoccurring. It argues that climate change will have significant negative consequences for pastoralists. These will include loss of livestock through heat stress, more frequent agricultural encroachment as variation in rainfall may raise the productive potential of arid areas, increase in frequency of flooding, spread of human and livestock diseases that thrive during the wet season, and when rainfall decreases or becomes more erratic the quality of grazing lands will decrease. All these will impoverish pastoralists further. It is expected that this scenario will be more prevailing in the Horn of Africa and the arid zone.

The second scenario argues that climate change on its own will not have a negative impact on pastoralists. The argument is that pastoral production system is already an adaptation to hostile environment. Nevertheless, pastoralists face more severe challenges, such as political and economic marginalization, inappropriate development policies, and increasing resource competition. All these hinder their way of life and adversely affect their social cohesion. These challenges will stifle their ability to adapt to changes in their external environment. It is estimated that this scenario will be applicable to the semi-arid zone, and is more relevant to the situation of central Nigeria.

The last scenario presents a hopeful picture. It argues that pastoralists could actually benefit from climate change, as more rainfall can result in drier season pasture and prolong access to wet season pasture. It can also result in less frequent drought, which may mean more time for people to rebuild their assets between lean times. Climate change conversely, could conceivably lead to the creation of more dry land resources that are suited to pastoralism, thus creating new opportunities for pastoralists. This scenario is applicable to areas which are relatively humid, which were formally inaccessible to pastoralists because of Trypanosomiasis. Climate change will work indirectly in breaking through the ecological barrier for pastoralists.

Whichever position is subscribed to, there is a common thread that runs through all the scenarios, which is the issue of preparedness. There is an urgent need to invest in disaster risk reduction measures and climate change adaptation (UNOCHA, 2009). Other indirect impacts are sometimes harder to link directly to climate change, since these factors are mostly a combination of both climate change and other factors. However, it can be said that climate change has a compounding effect on the already difficult circumstances for communities that live in the arid and semi-arid zones of Africa.

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〔産業財産権〕

〔その他〕

Materials collected in fieldwork and various data will be analyzed and papers will be published in Japanese and International academic journals. The researcher also plan to present the results of this research in academic conferences in Japan and overseas. The researcher is deeply indebted to local research assistants and pastoralists who have offered the most sincere and generous help to the researcher.

6. 研究組織		
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