J. Viet. Env. **2014**, Vol. 6, No. 3, pp. 212-219
DOI: 10.13141/jve.vol6.no3.pp212-219

JOURNAL of VIETNAMESE ENVIRONMENT

Human ecology and gender: a framework to discover natural and cultural resources with climate change accommodation

Sinh thái nhân văn và vấn đề giới: Khung lý thuyết áp dụng trong nghiên cứu tài nguyên thiên nhiên và văn hoá thích nghi với biến đổi khí hậu

Research article

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Based on the human ecological pyramid described by Robert Ezra Park, the founder of Human Ecology at Chicago School of Sociology around 1920 (Park 1952; visualized by Teherani-Krönner 1992), Duncan developed his model for comprehensive research on changes in human societies. He believed that scientific analysis had to include the interplay and interaction of the following components: population (P), organization (O), environment (E) and technology (T). This research frame – POET - became known as the Ecological Complex visualized as a rhombus (Duncan 1959; Teherani-Krönner 1992; Teherani-Krönner 2014). Such an approach needs inter- and trans-disciplinary research methodologies. Combining this human ecological model with theoretical and conceptual approaches in gender studies (Boserup 1970, Teherani-Krönner 2014) will open a new perspective to gender sensitive environmental researches. As the UNDP has stated: "human development if not engendered, is endangered". This simple but far-reaching message of Human Development Report (UNDP 1995) should be taken more seriously into account in theoretical and practical work (gender mainstreaming and gender budgeting). The gender gap (FAO 2011) will be a roadblock to sustainable environmental development (Jacobson 1992) under climate change conditions. Therefore the POET model needs to be engendered. The paper will present a new concept and a methodological framework to discover natural and cultural resources with regard to climate change accommodation.

Trên cơ sở tháp sinh thái nhân văn có lồng ghép giới được xây dựng bởi Robert Ezra Park, nhà sáng lập ngành học về sinh thái nhân văn tại trường Khoa học xã hội Chicago vào khoảng năm 1920 (Park 1952; do Teherani-Krönner thể hiện năm 1992), Duncan đã phát triển một mô hình nghiên cứu toàn diện về sự thay đổi trong xã hội loài người. Ông cho rằng các phân tích khoa học cần phải bao gồm sự tương tác qua lại giữa các thành tố sau: dân số (P), tổ chức (O), môi trường (E), và công nghệ (T). Khung nghiên cứu này được gọi tắt là POET, được biết tới với tên gọi tổ hợp sinh thái, và được thể hiện bằng hình ảnh của một hình thoi (Duncan 1959; Teherani-Krönner 1992; Teherani-Krönner 2014). Cách tiếp cận này cần phải sử dụng các phương pháp nghiên cứu liên ngành và đa ngành. Kết hợp mô hình sinh thái nhân văn với các cách tiếp cận về lý thuyết và định nghĩa trong các nghiên cứu về giới (Boserup 1970, Teherani-Krönner 2014) sẽ mở ra một hướng nghiên cứu mới đối với các nghiên cứu về môi trường có liên quan tới nhạy cảm giới. Tổ chức Phát triển LHQ (UNDP) đã nêu rõ: "Nếu sự phát triển của con người không tính đến vấn đề giới, sự phát triển đó sẽ gặp trở ngại". Thông điệp đơn giản nhưng hàm chứa này được nêu trong báo cáo: Phát triển con người của UNDP (1995) cần được xem xét một cách nghiêm túc hơn trong lý thuyết và thực tiễn (lồng ghép giới và lập ngân sách có tính đến vấn đề giới). Khoảng cách về giới (FAO 2011) sẽ là một cản trở trên con đường phát triển môi trường bền vững (Jacobson 1992) trong các điều kiện biến đổi khí hậu hiện tại. Do đó, mô hình POET cần được xem xét cả từ góc độ giới. Bài viết đưa ra một khái niệm mới và một khung phương pháp logic nhằm phát hiện các nguồn lực tự nhiên và văn hóa trong bối cảnh biến đổi khí hậu.

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http://dx.doi.org/10.13141/JVE
ISSN: 2193-6471

Keywords: human ecology, gender & environment, gender budgeting, climate change accommodation

1. An ecological concept to environmental research

Environmental problems were recognized as evident some decades ago. We can mention the report of the Club of Rome as well as the pioneering work of Rachel Carson (Steiner 2013). Air, soil and water pollution as well as climate change are attacking the human livelihoods within rural and urban areas on local and global levels. As these problems do not occur within the frame of single scientific disciplines but in everyday realities, the research approaches have to be multidisciplinary and transdisciplinary in order to investigate and find proper solutions to the complex challenges.

2. The Concept of Human Ecology by Park

Robert Ezra Park can be seen as a father of Human Ecology. He teached in Chicago and became part of the scientific group that formed the Chicago School of Sociology in the beginning of the 20st Century. Together with the department of geography concepts of Human Ecology were created (Park / Burgess 1921). The research field was the city and the development and changes within urban life. Migration even at that time was an important issue within the big cities of USA: But human ecology and later cultural ecology broadened their scope of research looking for the interaction of human beings accommodating in space and time. Human ecological research and the understanding of social interactions need investigations in multiple levels: the ecological order, the economic order, the political order and finally the moral order. Human Ecology is different than biological models of ecology, as underlined by Park and Burgess (1921).

"In a society of human beings, however, this communal structure is reinforced by custom and assumes an institutional character. In human as contrasted with animal societies, competition and the freedom of the individual is limited on every level above the biotic by custom and consensus" (Park 1936/1952: 156).

Human Ecology as a social science approach was familiar with ecological processes within biology but aware about the differences. This can be demonstrated in the next chapter.

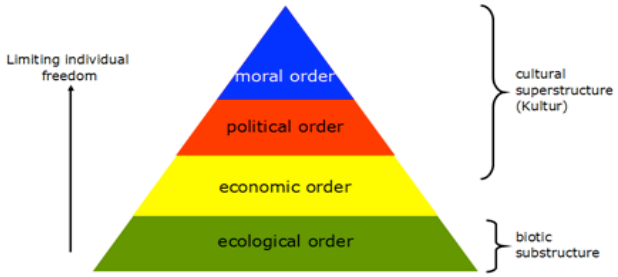


Figure 1. Human Ecological Pyramid
Constructed by Teherani-Kroenner, 1992, referring to Park 1936/1952: 156

3. Accommodation not Adaptation

The human ecological triangle can show the connections between Humans to their natural and build environment as well as to social organizations.

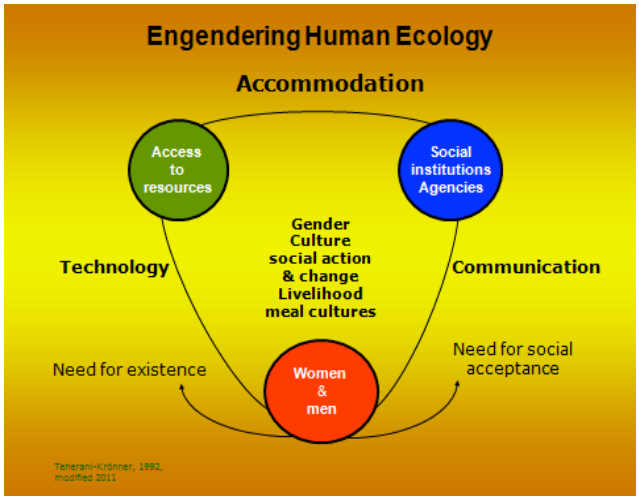


Figure 2. Engendering Human Ecology
Source: Teherani-Krönner (2014)

It looks as if the Human Ecologists were very conscious regarding their terminology. We can follow the differentiating between processes in natural biology and those within cultural settings. Park and Burgess have carefully distinguished between the two expressions: adaptation and accommodation. Unfortunately this important specification has not been recognized and given the needed attention so far.

The term *adaptation* came into vogue with Darwin's theory of the origin of species by natural selection. This theory was based upon the observation that no two members of a biological species or of a family are ever exactly alike. The individuals best fitted to live under the conditions of life, which the environment offered, survived and produced the existing species. The others perished and the species that they represented disappeared. Adaptations were the variations that had been in this way selected and transmitted.

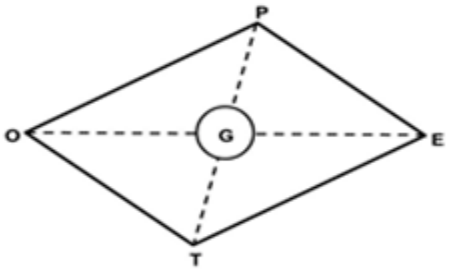
The term *accommodation* is a kindred concept with a slightly different meaning. The distinction is that adaptation is applied to organic modifications which are transmitted biologically, while accommodation is used with reference to changes in habit, which are transmitted, or may be transmitted, sociologically, that is, in the form of social tradition" (Park/Burgess 1921/1969: 663).

Here we find the specific way in which human beings interact with their environment by traditions, their customs and cultural value systems named "accommodation". This in fact is slightly different to the realm of biology where the term adaptation can be used. This is why we prefer to use this not yet familiar term and write about climate change accommodation. Accommodation underlines the fact that it is a human made process of continuous change in interaction with the environment. We should look to ovoid the sources of pollution and warming without neglecting the search for solutions regarding the processers that are foreseeable.

4. The Human Ecology Complex by Duncan[1]

In a publication called: "Human Ecology and Population Studies" Otis Duncan (1959) introduced his concept of Population in interactions with the environment. He developed his model for comprehensive research on societies. Duncan believed that social scientific analysis must include the interplay and interaction of the following components: Population, Organisation, Environment and Technology. This research approach became known as the Ecological Complex (Duncan 1959; Mackensen 1978; Teherani-Krönner 1992a).

G Gender – this is an additional point - which Teherani-Krönner has added as a result of combining the ecological complex with Ester Boserup's approach on Gender in Economic Development (Teherani-Krönner 2014).



P: Population
O: Organisation
E: Environment
T: Technology

Figure 3. Ecological Complex
Source: Duncan 1959; Mackensen 1978; Teherani-Krönner 1992a

For Duncan, these components were important for analysing what he called the 'level of living' (L). He conceptualised 'the level of living' as a function of the four points of his rhombus: "L = f (P, O, E, T)" (Duncan 1959, p. 707). The challenge is the interrelation of these components that Duncan combined in his model to address questions of social change and processes of development.

According to Duncan, a sociological "...account of social change is attempted by referring to such instigating factors as environmental change (whether caused by man or by other agencies), changes in size and composition of population, introduction of new techniques, and shift in the spatial disposition or organization of competing populations. The interdependence of factors in the adaptation of a population implies that changes in any of them will set up ramifying changes in the others" (Duncan 1959, p. 683, as cited in Teherani-Krönner 1992a, p. 138).

The interrelations and dependencies within this ecological complex are important for the following processes of social change within a human ecological framework. Duncan wanted to overcome the weaknesses of other social scientific discourses because they use fewer components to explain social processes.

"Malthus, of course, emphasized P, or rather the ratio, P/E, attributing only secondary importance to T and O. Marx's theory was notable for its emphasis on O. The theoretical and empirical case for the importance of T has been presented by Ogburn (1951)" (Duncan 1959, p. 707, as cited in Teherani-Krönner 1992a, p. 137).

As Duncan perceived it, the aim of human ecology is to consider all these components rather than focusing on single items and their relationships. The inclusion of these components transcends any single discipline. This holistic approach is what Duncan sought and what he found lacking within the great theoretical discourses of his time.

In my view, we can reshape Duncan's ecological complex as a concept of livelihood (L) and combine it with Boserup's approaches to engender the human ecological models (Teherani-Krönner 2008b).[2]

5. Engendering the Concepts of Human Ecology by Teherani-Krönner

With her pioneering comparative studies in Asia, Africa, and Latin America, Boserup provided empirical evidence of the importance of women in agricultural activities and rural development (Boserup 1970). She as well has worked on population and technological innovations. Combining Boserup's holistic approach with the ecological complex designed by Otis Duncan generates a fruitful synergy that enables us to engender scientific thinking in the field of environmental development within a livelihood concept. A gender-sensitive concept of livelihood

[1] Parts of this text has been published recently in Teherani-Krönner 2014a

[2] Based on her empirical research on an irrigation project in Southwest Iran, Teherani-Krönner introduced an engendered model of human ecology (Teherani-Krönner 2008).

(L) can be formulated as L = f (P, O, E, T) G, from a gender perspective.

As a combination of Duncan and Boserup, I suggest the following description of P, O, E, T:

P - Population was one of the key questions that Boserup investigated. In contrast to Malthus, she demonstrated the importance of population density in developing innovative agricultural techniques and methods of cultivation and intensification. Looking at population age and gender as well as ethnicity and class are crucial to understand social coherence and conflicts. We need to look at P from a social and cultural science perspective that e.g. influences people's activities and attitudes leading to population growth.

E - Environment was the source and means of production according to Boserup. This includes agricultural land and the environmental conditions that influence the mode of production. Environmental conditions are important as the basis for agricultural production that shape the type of cultivation activities. Boserup was aware that environmental changes affect living conditions and gender relations.
When Boserup collected her data about agricultural development while she was working for UN organisations and during her stay in India in the 1950s and 1960s, ecological and environmental conditions were not recognised as being in danger as they are now.

T – Technology, as perceived by Boserup, was the creative power enabling people to cope with population growth and differences in ecological settings. Technological innovation and changes in cultivation practices are how people accommodate[3] changes in environmental conditions, including population density. In other words, a certain population density is needed for a certain technology to make sense. Some pressure must exist to create adequate coping technologies. However, advanced technologies do not guarantee the wellbeing of all the people in a regional setting because they are not equally beneficial to everyone. In the field of agriculture technological innovations can increase differences of economic and social benefits. There are winners and losers. It was Boserup who clearly pinpointed the differences that can occur between women and men when new agricultural technologies are implemented that lead to gender gaps.

"Thus, in the course of agricultural development, men's labor productivity tends to increase while women's remains more or less static. The corollary of the relative decline in women's labor productivity is a decline in their relative status within agriculture, and, as a further result, women will want either to abandon cultivation and retire to domestic life, or to leave for the town" (Boserup 1970, p. 53).

O – Finally, the organisation—the human arrangements or social institutions—was discussed in combination with the modes of agricultural production and the division of labour. Organisation refers in particular to the different types of agricultural practice, "from shifting cultivation to permanent cultivation of privately owned land" (ibid, p. 57), using plows and later tractors mostly operated by male farmers, that Boserup used to classify the division of labour between women and men. The gender division of labour and the productivity gap between women and men that Boserup emphasised built a foundation for social organisations and institutions. P, E, and T are the components that lead to O. Because these other components build mutual and dynamic relationships, the social organisation can also influence the other elements of the ecological complex.

Boserup underlines the importance of O regarding land policies with respect to gender relations.

"With few exceptions, privatization of land leads to a deterioration in the status of rural women. Under the system of common tenure, both male and female community members had the right to use the land for cultivation either by simply farming it or by having it assigned to them by the village chief" (Boserup 1989, p. 49).

Boserup investigated the communal land systems where women had the right to cultivate land. Her position was taken up by Elinor Ostrom, who reexamined and fundamentally criticised the thesis of the 'tragedy of the commons' in her work, "Governing the Common" (Ostrom 1990). Ostrom was subsequently honoured with the Nobel Prize in Economics in 2009.

G – G stands for Gender or Gender Order. It is a new aspect in the Ecological Complex. The crosscutting space of the rhombus and the core reflects the interplay between PETO components. This is a space to demonstrate and visualise what Boserup has called the 'status of women' by analysing different components. With this concept, gender order as a social and cultural construction can be based on the components of the ecological complex.

I will revisit the concept in my conclusions and the following illustrations. The status of women has often been explained by referring to culture and socio-cultural backgrounds of societies. It was and mostly still is treated as a black box, somehow inaccessible to scientific investigation and analysis. However, with G in the centre of the Ecological Complex, a new space for scientific research can be discovered within human ecological studies and the related fields of research.

[3] Accommodation is the term human ecology has used to describe the interaction of human beings with their environments via culture instead of the expression adaptation, which belongs to the sphere of biology (Teherani-Krönner 1992a, p. 92 f. and 154 f., referring to Park and Burgess 1921, p. 664).

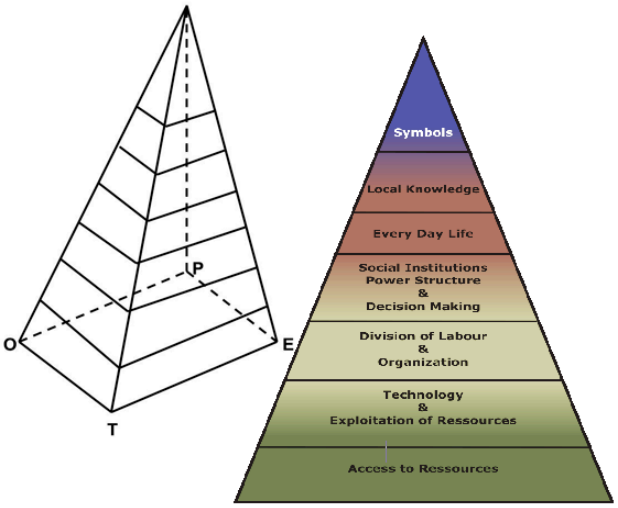


Figure 4. Seven stepts to a new engendered human ecological pyramid
Source: Teherani-Kroenner (2008)

The broadened human ecological pyramid on seven levels can help to develop gender sensitive research concepts. Looking at all the different aspects can be understood as seven necessary steps in the research process in order to understand the societal ecological and economical basis. The technologies allow understanding the mode of production in natural resources accommodation. Another important information is about the division of labor like: who is doing what - and about the social responsibilities in the productive and social reproductive sphere. Close to this step it is important to learn about the power structure and the relationship of members of a community as well as their solidarity and mutual help. The everyday life is important as to learn about the routine and the way people perform their activities and duties. Local knowledge gives us the chance to learn about people's abilities and practical tasks. With the last step, the symbolic system there will be an opportunity to understand the reasoning and logic of people's value system. In order to understand people's preferences and their philosophy of life it is necessary to understand their priority setting that make their scope of action possible. We have to respect the taboos and their attitude towards the sacred that exist in each and every culture.

6. Framework for Empirical Research – A Case Study in Vietnam

We can find some researches in Vietnam using the human ecological framework.

One of the first papers that has mentioned human ecology in Vietnam is about "Some issues of human ecology and development in Vietnam" by Le Trong Cuc and Terry Rambo (1995). This paper included a concept of human ecology and has described the link between natural ecosystem and human ecology, besides analyzing a case study of agricultural ecosystem in an upland region in Vietnam.

Dang Tung Hoa (2000) has investigated the research on "Cultural and Ecological Investigations into Forest Utilization by the Thai, Hmong and Kinh People in the Mountainous Region in the Yen Chau District of Northwest Vietnam with Respect to Gender relation". This study compared forest use between three ethnic groups Thai, Hmong and Kinh and has given recommendations concerning land use policy based on human ecological conditions.

Nguyen Tien Hai (2009) focused on research on "Human Ecological Analysis of land and forest use by the Hmong people for harmonizing with the governmental reforestation program in Vietnam". The study result shows that there is a clear difference on both the governance structures and the performance between the village forest management model and the sub-village forest management in Lao Cai province of Nordwest of Vietnam.

Do Thi Huong (2010) has applied the human ecological framework in her research on impact of local community on forest resources at Thuong Tien Nature Reserve in Kim Boi district, Hoa Binh province.

Dang Tung Hoa, Nguyen Thi Lan Huong (2011) applied the human ecological framework to the research on **"**Water Resources Management based on Human Ecology concept – Case Study in Tam Dao National Park in Vietnam". The recommendations from study are effective water resources management based on local human ecological condition.

Uibrig, Nguyen Tien Hai and Dang Tung Hoa (2011) mentioned in their paper on "The challenge of harmonization between formal and customary land use planning" that the interrelationships between nature and humans are key issues in research and practice of sustainability oriented land use. They based on the culture-ecological action model from Teherani-Kroenner (1992) and human ecosystem model after Machlis at al. (1997).

7. Gender Mainstreaming and Gender Budgeting towards environmentally and sound development under climate change context

Gender mainstreaming

While changes in the environment affect everyone, they affect men and women differently. Women's and girls' traditional responsibilities as food growers, water and fuel gatherers, and caregivers connect them closely to available natural resources and the climate change, making them more likely to be impacted by environmental hardships. Due to longstanding inequalities that silenced their voices and neglected their needs, poor women are also disproportionately impacted by increasingly longer droughts, more severe storms and flooding, species depletion, soil degradation, deforestation, and other negative environmental changes e.g. the several climate changes.

Identifying and addressing women's and men's needs, as well as promoting women as decision makers, are critical elements to ensuring the success of environmental policy and programming (UNDP 2014).

Women are not only victims of climate change and environmental degradation, they also possess knowledge and skills that are important and critical to finding local solutions to environmental challenges. Out of experience one can show, that the livelihood of households and communities depends greatly on the resiliency of women. Environmental policies, projects and financial programs, therefore, should incorporate and benefit from this know-how. Respecting as well as supporting women - as they face today's unprecedented environmental challenges – is key to sustainable development of today and future. Given the requisite tools and support, women are a driving force for a new model of growth which is both more equitable and sustainable.

As mentioned before processes of empowerment are part and parcel of a more holistic view and can be initiated at all the mentioned seven steps of the described pyramid: Access to productive resources, equipped by needed technologies. Respecting the division of labor and work load within the social institutions, and paying attention to the routine and everyday life of people with their local knowledge will help to understand the cultural value system and the symbols and taboos that might be very different among the diverse ethnic groups.

There are 7 applied steps (see figure 4) as follow: 1) access to resources; 2) technology and exploitation of resources; 3) division of labor and organization; 4) social institution, power structure and decision making; 5) every day life; 6) local knowledge; 7) symbols (Teherani-Kroenner 2014).

8. Some recommendations

Human ecology as useful framework to environmental research

Human ecology can be used as interdisciplinary research frameworks in providing an analytical concept to the environmental challenges facing rural environments. Now the concrete research methodology still needs special reflection concerning the utilization of quantitative and qualitative methods with regard to the specific fields and dimensions of the human ecological pyramid (Teherani-Kroenner 1992, Dang Tung Hoa 2000). Implementation of them remains empirical and requires better control. The experience acquired from practical development of such projects should be shared more often in networks of teams to compare their behavior and identify common rules of functioning.

The studies and concept development based upon human ecological theory range from very abstract to concrete issues concerning environmental/ natural resources management.

Engendering rural development, environment and natural resources management with climate change accommodation

Climate change is the defining human development issue of our generation. The Human Development report 2007/2008 acknowledges that climate change threatens to erode human freedoms and limit choice. The report further underscores that gender inequality intersects with climate risks and vulnerabilities. Poor women's limited access to resources, restricted rights, limited mobility and muted voice in shaping decisions make them highly vulnerable to climate change. The nature of that vulnerability varies widely, cautioning against generalization but climate change will magnify existing patterns of inequality, including gender inequality (UNDP 2009).

While underscoring the vulnerability of poor women to climate change, it should also be acknowledged that women play an important role in supporting households and communities to mitigate and accommodate to climate change. Across the developing world, women's leadership in natural resource management is well recognized. For centuries, women have passed on their skills in water management, forest management and the management of biodiversity, among others. Through these experiences, women have acquired valuable knowledges that will allow them to contribute positively and creatively to the identification of appropriate adaptation and mitigation techniques, if only they are given the opportunity and be included it the whole process of identifying and solution finding strategies to the concrete given problems on the ground. Their participation in this process will be the most important challenge to empowerment strategies. Therefore they should be included in all project stages and programs related to environment and natural resources management.

What we should do:

- Improve understanding and analysis of gender, environment and climate change;
- Gather, produce and document information;
- Invest effective communication and participation with the respected actors;
- Integrate international and national policies;
- Plan and develop gender-responsive policies and strategies;
- Strengthen national and local capacities.

One possibility is to introduce the gender budgeting approach in conceptualizing climate change programmes. This will definitely help to find a better gender balanced situation in dealing with challenges regarding climate change accommodation.

Gender Budgeting

A gender budget is not a separate budget for women. Rather, gender budgets are an attempt to assess government priorities as they are reflected through the budget and examine how they impact women and men and within that, certain groups of women and men. Gender budgets do not look at whether or not the same is spent on men and women but rather at what the impact of the spending is on men and women and whether or not budgets respond to the needs of both women and men adequately.

Budgets are not gender neutral. Budgets can either promote women's equality or exacerbate women's inequality — in other words, budgets can either increase income gaps and other forms of inequality between women and men, or they can lessen them. Budgets are one of the most influential policy documents governments have because without money a government cannot implement most other policies or programs. Gender budgets are however not simply about spending, they also examine government revenue — how a government gets the money it spends — and the implications of that for women and men (UNDP 2007).

"Women's budgets", "gender budgets", "gender-sensitive budgets", and "gender responsive budgets" are all terms that are used to describe initiatives that have used gender as lens from which to analyze budgets at national, regional, and civic levels (UNPAC 2010).

We hope that with this recommendation a concrete step towards sustainability in regional development and natural management can be taken that aims at gender justice and social wellbeing.

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