The Impact of Climate Change on Regional Instability

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Abstract: With the improvement of industrialization and the development of science and technology, the frequency of global meteorological disasters is increasing. The effects of climate change have threatened human existence. For some economically underdeveloped countries, this impact may increase national vulnerability[1]. So climate change has evolved from a environmental issue into an economic and political one. Measuring the vulnerability of a country is essentially a kind of evaluation problem. Therefore, we propose a multi-level fuzzy comprehensive evaluation model. Firstly, we use analytic hierarchy process (AHP) to determine the weight distribution of each factor. Secondly according to the collected data, we use statistical analysis to solve the correlation between climate change and national vulnerability, and display the results in the image.

Keywords: Climate change; National vulnerability; Fuzzy synthetic discrimination

1. Introduction

For climate change brought about by the extreme weather disasters, which brings to the already weak government system the extra pressure, disrupts economic activity, makes people displaced, often require a massive humanitarian aid. This is beyond the control of the fragile state. So, it's necessary to comprehensively consider the effect of various factors to build a mod- el in order to ascertain the vulnerability of a country.

2. Analytic Hierarchy Model

The basic idea of analytic hierarchy process is the same as the thinking and judgment process of a complex decision problem. To determine the vulnerability or stability of a country, the final judgment can be roughly divided into stable, vulnerable and fragile categories. According to the relevant data, there are 12 influencing factors. And we can compare the three evaluation results through these 12 criteria. We mainly use this model to determine the weight of each factor.

The above process can be broken down into three layers. The upper layer is the target layer, which is the determination layer of national stability. The bottom layer is the scheme layer, which includes stable, vulnerable and fragile. The middle layer is the criterion layer, which includes the 12 criteria of Security Apparatus (C1), Factionalized Elites (C2), Group Grievance (C3), Economy (E1), Economic Inequality (E2), Human Flight and Brain Drain (E3), State Legitimacy (P1), Public Services (P2), Human Rights (P3), Demographic Pressures (S1), Refugees and IDPs (S2), External Intervention (X1). The links between the layers are connected in a straight line, as shown in the Figure 1.

Combine the weight of the scheme layer to the criterion layer and the weight of the criterion layer to the target layer, and the weight of the scheme layer to the target layer is finally determined.

If we want to compare the impact of n factors in a layer on one of the factors O in the upper strata, such as the importance of the C1, C2, C3, E1, E2, E3, P1, P2, P3, S1, S2, X1 factors to be achieved in this question in determining the goal of national vulnerability, then we can take two factors, i and j, and then use d_{ij} to denote the ratio of the impact of i and j on O. All the comparison results constitute a pair comparison matrix

$D = (d_{ij})_{nn}$,

where $d_{ij}>0$, $d_{ij}=0$. It's easy to know that $d_{ii}=d_{jj}=1$. We can get a positive

reciprocal array. According to the characteristics of the positive reciprocal matrix, there are the following results:

$D·A = \lambda A$.

That is the eigenvectors of the maximum characteristic root which can be used as weight vector

$A = [a_{i1}, a_{i2}, · · ·, a_{in}]$ and $= 1$.

3. Solve the Model with Fuzzy Comprehensive Evaluation

Based on the above two models, the multi-level fuzzy comprehensive evaluation method can be applied to evaluate the index value. In the secondary evaluation vector we deter- mine the specific type of each country according to the principle of maximum member- ship. Global climate change is becoming more and more frequent, at the same time the bad weather is increasing, including hurricanes, monsoons, floods, droughts and so on. According to the literature in the topic, we understand that climate change can have the following effects.

Bad weather will reduce food production.
Business and trade capacity will be reduced.
Water resources will be reduced (mainly due to the scarcity of freshwater resources).

People's physical health is under threat and the rate of disease increases.
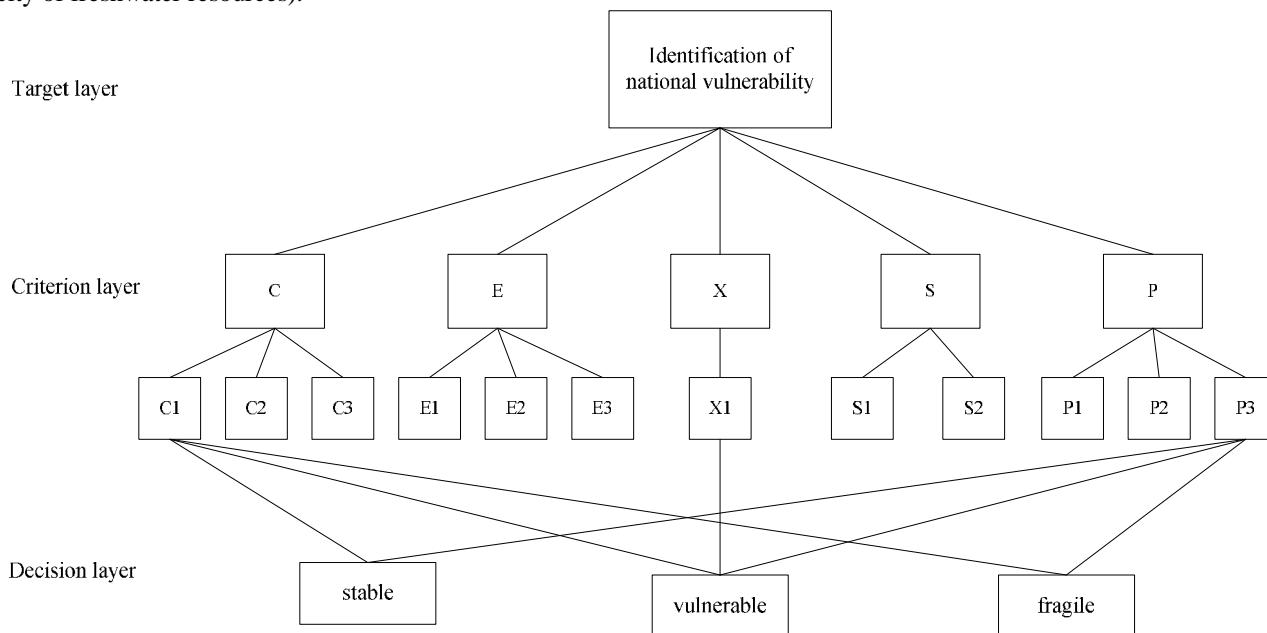National security will decline.

Figure 1: Relational Graph

The human capacity of the earth's environment will decline, resulting in small conflicts in fragile states due to resource constraints, and even war.

From the above points we can get the environmental change directly and indirectly affect the vulnerability of a country. First of all, we collect a country's climate change indicators and the factors that affect the stability of the country, then we conduct a correlation analysis to get the correlation between climate change indicators and other factors. Finally, we can understand how the direct and indirect impacts of climate indicators are generated,

and establish a link between climate indicators and national vulnerability.

References

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