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Climate change and food security: situation, challenges and response policy from Nepal, India And Vietnam: a comparative study

Mudanças Climáticas e Segurança Alimentar: situação, desafios e política de resposta no Nepal, Índia e Vietnã: um Estudo Comparativo

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Sumário

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Climate change and food security: situation, challenges and response policy from Nepal, India And Vietnam: a comparative study*

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Abstract

Food insecurity is a global issue, and climate change is getting worse in many regions of the world, it exacerbates instability and inequality while endangering human life and peace. Droughts, floods, storms, and other climate change-related phenomena are making it harder for countries to feed their populations and endangering food supply, accessibility, and usage as well as the stability of the world food system. As a result, there are rising rates of hunger and mortality and a large number of individuals falling into poverty. The following paper by the authors will present a picture of national and international legal concerns concerning food security in the context of climate change in various ASIAN developing countries. To accomplish this, the article will include (i) the international legal framework on food security and climate change, (ii) the current situation, trends, and policy responses of some of the countries chosen as research subjects, and (iii) typical recommendations.

Keywords: food security; right to food; climate change; human rights; Asia developing countries.

Resumo

A insegurança alimentar é um problema global, e as mudanças climáticas estão se agravando em muitas regiões do mundo, exacerbando a instabilidade e a desigualdade, além de ameaçar a vida humana e a paz. Secas, inundações, tempestades e outros fenômenos relacionados às mudanças climáticas estão dificultando a capacidade dos países de alimentar suas populações, comprometendo o abastecimento, a acessibilidade e o uso dos alimentos, bem como a estabilidade do sistema alimentar global. Como consequência,

há um aumento das taxas de fome e mortalidade, além de um número significativo de pessoas sendo empurradas para a pobreza. O presente artigo oferecerá uma análise das questões jurídicas nacionais e internacionais relacionadas à segurança alimentar no contexto das mudanças climáticas em diversos países em desenvolvimento da Ásia. Para isso, o estudo abordará: (i) o marco jurídico internacional sobre segurança alimentar e mudanças climáticas, (ii) a situação atual, as tendências e as respostas políticas adotadas por alguns dos países escolhidos como objeto de pesquisa, e (iii) recomendações estratégicas típicas.

Palavras-chave: segurança alimentar; direito à alimentação; mudanças climáticas; direitos humanos; países em desenvolvimento da Ásia.

1 Introduction

António Guterres - Secretary-General of the United Nations said that "a global food crisis is creating a hellscape of hunger and heartache for many of the world's poorest people"[1]. Poverty is both the root and consequence of conflict, while climate change is a factor that aggravates food insecurity and increases threats to international peace and international stability[2]. Indeed, recurring crises caused by conflicts, natural catastrophes, and pandemics have «rocked» the global food system, plunging millions into poverty. However, the climate crisis is one of the primary drivers of the dramatic increase in world hunger. Climate shocks ruin lives, crops, and livelihoods, reducing people's ability to feed themselves. Famine will spiral out of control if the world does not act promptly on climate change[3].

Several studies have also shown that climate change is the main cause of food insecurity as it directly creates devastating impacts on food security including four factors – food availability, food accessibility, food utilization and food system stability[4]. And

> the climate crisis spares no one, but it does not affect everyone equally or in the same way. The populations at greatest risk are those that depend on agriculture and natural resources because their livelihoods are vulnerable to climate change impacts, and their capacity to respond is limited, making them prone to disputes arising from the scarcity of natural resources (Beth Bechdol - Deputy Director-General of FAO)[5].

Although 'food security' is not a legal concept and does not impose rights or responsibilities, it is a necessary precondition to the full enjoyment of the right to food[6]. The term food security is used in many international instruments such as conventions, treaties, protocols, and agreements. In a simple way, food security means enough food for people to eat, produced from a sustainable food system[7]. Food security refers to the

[1] CLIMATE Action Can Help Fight Hunger, Avoid Conflicts, Official Tells Security Council, Urging Greater Investment in Adaptation, Resilience, Clean Energy. *United Nations*, 13 Feb. 2024. Available at: https://press.un.org/en/2024/sc15589.doc.htm. Access on: 20 May 2024.

[2] VIỆT NAM nỗ lực giảm thiểu tác động của biến đổi khí hậu và mất an ninh lương thực [Vietnam strives to minimize the impact of climate change and food insecurity]. *TTDN*, 15 Feb. 2024. Available at: https://ttdn.vn/co-quan-dai-dien-va-kieu-bao/co-quan-dai-dien/viet-nam-no-luc-giam-thieu-tac-dong-cua-bien-doi-khi-hau-va-mat-an-ninh-luong-thuc-98203. Access on: 20 May 2024.

[3] WORLD FOOD PROGRAMME. A global food crisis. *WFP*, c2025. Available at: https://www.wfp.org/global-hunger-crisis. Access on: 20 May 2024.

[4] IPCC. Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [Special Report]. *Intergovernmental Panel on Climate Change (IPCC)*, 2019. Available at: https://www.ipcc.ch/srccl/. Access on: 20 May 2024.;
HONG YEN, Nguyen Thi; DUNG, Nguyen Phuong. Biến đổi khí hậu và vấn đề bảo đảm quyền có lương thực tại Việt Nam: thực trạng và kiến nghị [Climate change and the issue of ensuring the right to food in Vietnam: current situation and recommendations]. *Tạp chí Nghiên cứu lập pháp [Journal of Legislative Studies]*, n. 04, 476, Feb. 2023.;
FAO. *Climate change and food security*: a framework document. Rome: FAO, 2008. Available at: https://web.archive.org/web/20220325152622id_/https://www.fao.org/3/k2595e/k2595e00.pdf. Access on: 20 May 2024.

[5] CLIMATE Action Can Help Fight Hunger, Avoid Conflicts, Official Tells Security Council, Urging Greater Investment in Adaptation, Resilience, Clean Energy. *United Nations*, 13 Feb. 2024. Available at: https://press.un.org/en/2024/sc15589.doc.htm. Access on: 20 May 2024.

[6] ELVER, Hilal. Food Security. *In*: GEIß, Robin; MELZER, Nils (ed.). *The Oxford Handbook of the International Law of Global Security*. Oxford: Oxford Academic, 2021. Available at: https://doi.org/10.1093/law/9780198827276.003.0028. Access on: 22 June 2024.

[7] TANSEY, G.; RAJOTTE, T. (ed.). *The Future Control of Food*: A Guide to International Negotiations and Rules on Intellectual Property, Biodiversity and Food Security. London: Earthscan, 2008. Available at: https://idrc-crdi.ca/sites/default/files/open-ebooks/397-3/index.html. Access on: 29 May 2024.;
ZUHRA, Amalia. A legal analysis on food security under international environmental law. *Masalah-Masalah Hukum*, v. 43, n. 4, p. 600-606, 2014. Available at: https://ejournal.undip.ac.id/index.php/mmh/article/download/11094/9646. Access on: 29 May 2024.

state or condition "when all people at all times have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life"[8]. Climate change is a growing concern that highly affects the food security of any country. The impact of climate change in developing countries is immense in different aspects such as causing extreme heat, changing rainfall patterns, droughts, reducing groundwater levels, glacier melt in the Himalayan region, sea level rise, loss in agricultural production/ yield, lack of food security or increase in price of food grains, causing energy scarcity by affecting hydropower and thermal power generation, lack of water security, causing health issues, resulting in migration and related conflicts.

Poverty remained alarmingly high throughout the first twenty years of the twenty-first century. According to the Global Food Crisis Report for 2021, people are surpassing all prior records in a bad manner[9]. Food distribution is uneven, putting the world's poorest regions at risk of hunger. According to the United Nations, the number of deaths caused by food shortages is on the rise, with almost 828 million people going hungry every day by 2022[10]. According to statistics, each year, more than 30% of the planet's food production is expired or thrown away before reaching consumers. This number corresponds to 1.3 billion tons of food being thrown away. Wasting food leads to wasting money. When calculating simply, the world wastes 100 billion USD every year just because of food waste. 250 billion m3 of water used to produce this food is also wasted[11]. According to a report by the World Bank, the number of people suffering from severe food insecurity increased from 135 million in 2019 to 345 million in 82 countries in June 2022 due to the war in Ukraine and supply chain disruptions. The response and ongoing economic downturn of the COVID-19 pandemic have pushed food prices up[12]. Climate change in combination with the COVID-19 pandemic have obstructed the progress against hunger and is anticipated to add a number of 78 million people confronted with chronic hunger by 2050 regardless of the existence of climate change[13].

These data hold great significance and have raised concerns for all nations. Thus, in order to prevent escalating hunger among people worldwide, we must take immediate action to save lives and invest in solutions to assure food security, stability, and peace for all[14]. However, «climate action» is difficult, and no country can fight alone in this «long-term» struggle. Conflicts, economic recession, exceptional climate change, and rapid population growth in some areas are providing challenges for governments in terms of eradicating hunger, reducing poverty, adjusting to climate change, and minimizing its consequences on the global food security system.

Using both qualitative and quantitative approaches, after a long process of collecting and analyzing data, reports as well as assessing the current situation of climate change and the existing and potential impacts in some Asian countries - which are identified as having many countries and territories that will be severely affected by climate change, by skillfully and deliberately using the comparative method in jurisprudence, the authors will (i) present the some international instruments in ensuring food security in climate change context; (ii) analyze

[8] FAO. The state of food insecurity in the world. Rome, Italy. *FAO*, 2012. Available at: https://www.fao.org/4/i3027e/i3027e.pdf. Access on: 29 May 2024.

[9] PHUONG, Thao. Biến đổi khí hậu và an ninh lương thực trong thế kỷ 21 [Climate change and food security in the 21st century]. *Laodong.vn*, 13 Jan. 2023. Available at: https://laodong.vn/tu-lieu/bien-doi-khi-hau-va-an-ninh-luong-thuc-trong-the-ky-21-1137462.ldo. Access on: 25 May 2024.

[10] PHUONG, Thao. Biến đổi khí hậu và an ninh lương thực trong thế kỷ 21 [Climate change and food security in the 21st century]. *Laodong.vn*, 13 Jan. 2023. Available at: https://laodong.vn/tu-lieu/bien-doi-khi-hau-va-an-ninh-luong-thuc-trong-the-ky-21-1137462.ldo. Access on: 25 May 2024.

[11] LINH, Khanh. Giải pháp cấp bách cho vấn đề khủng hoảng lương thực toàn cầu. [Urgent solution to the global food crisis]. *Dangcongsan.vn*, 15 Apr. 2024. Available at: https://dangcongsan.vn/cung-ban-luan/giai-phap-cap-bach-cho-van-de-khung-hoang-luong-thuc-toan-cau-663129.html. Access on: 25 June 2024.

[12] WORLD BANK. What You Need to Know About Food Security and Climate Change. *World Bank*, 17 Oct. 2024. Available at: https://www.worldbank.org/en/news/feature/2022/10/17/what-you-need-to-know-about-food-security-and-climate-change. Access on: 17 June 2024.

[13] SULSER, T. B.; WIEBE, K.; DUNSTON, S.; CENACCHI, N.; NIN-PRATT, A.; MASON-D'CROZ, D.; ROBERTSON, R.; WILLENBOCKEL, D.; ROSEGRANT, M. W. *Climate Change and Hunger*: Estimating Costs of Adaptation in the Agrifood System. Washington, DC: International Food Policy Research Institute (IFPRI), 2021. Available at: https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/134423/filename/134634.pdf.; HONG YEN, Nguyen Thi; DUNG, Nguyen Phuong. Biến đổi khí hậu và vấn đề bảo đảm quyền có lương thực tại Việt Nam: thực trạng và kiến nghị [Climate change and the issue of ensuring the right to food in Vietnam: current situation and recommendations]. *Tạp chí Nghiên cứu lập pháp [Journal of Legislative Studies]*, n. 04, 476, Feb. 2023.

[14] WORLD FOOD PROGRAMME. A global food crisis. *WFP*, c2025. Available at: https://www.wfp.org/global-hunger-crisis. Access on: 20 May 2024.

a relatively comprehensive picture of the current situation, challenges, and policy responses of several Asian countries (Nepal, India, and Vietnam) to the changing climate in order to ensure food security and the right to food; (iii) comment to the relationship between climate change, food security, and achievement of sustainable development goals in the countries; and (iv) in the last section of this paper, the authors will provide general observations and recommendations for all three countries based on their similarities.

2 Some international instruments in ensuring food security in the climate change context

Food security is closely related to environmental protection and human security. As a result, the international legal framework for guaranteeing food security in the face of climate change will draw on a wide range of disciplines, including international environmental law and human rights law. International law and commerce law... The writers will highlight a few key legal papers linked to concerns like:

The FAO International Treaty on Plant Genetic Resources for Food and Agriculture, 2001[15]. FAO stated that the conservation and sustainable use of plant genetic resources for food and agriculture are key to ensuring that the world will produce enough food to feed its growing population in the future[16]. The treaty was adopted by the Thirty-First Session of the Conference of the Food and Agriculture Organization of the United Nations on 3 November 2001. Its aim is (i) recognizing the enormous contribution of farmers to the diversity of crops that feed the world; (ii) establishing a global system to provide farmers, plant breeders, and scientists with access to plant genetic materials; (iii) ensuring that recipients share benefits they derive from the use of these genetic materials[17].

United Nations Framework Convention on Climate Change, Rio de Janeiro, 1992: The UNFCCC[18] was brought into force on 21 March 1994. The 196 countries as Parties to the Convention who had ratified it. India has signed the Convention on 10 Jun 1992 and ratified it on 1 Nov 1993. The UNFCCC is referred to as the "Rio Convention" as it was adopted at the "Rio Earth Summit" in 1992. The primary goal of the Convention is to stabilize greenhouse gas levels "at a point that avoids dangerous human-driven interference with the climate system." It emphasizes that this level should be reached in a timeframe that allows ecosystems to naturally adjust to climate change, ensures food production remains secure and enables sustainable economic development. The Convention places the responsibility on developed nations to take the lead in addressing climate change. Since they have historically been the primary contributors to past and present greenhouse gas emissions, industrialized countries are expected to make the greatest efforts to reduce emissions domestically. The Convention acknowledges that developing nations' contribution to greenhouse gas emissions will increase in the future. However, to achieve its ultimate objective, the Convention aims to assist these countries in curbing emissions in a manner that does not impede their economic growth.

The Kyoto Protocol, Japan, on December 11, 1997: This is an international treaty connected to the United Nations Framework Convention on Climate Change. It mandates its Parties to adhere to globally binding emissions reduction targets. India signed the Kyoto Protocol on 26 August 2002. During the first commitment period from 2008 to 2012, 37 industrialized nations and the European Community pledged to cut greenhouse gas emissions by an average of 5% relative to 1990 levels. For the second commitment period from 2013 to 2020, Parties committed to reducing emissions by at least 18% below 1990 levels. Under the Protocol, countries must achieve their targets mainly through domestic initiatives. Additionally, the Protocol provides three market-based mechanisms to help countries meet their targets: International Emissions Trading (IET), Clean Development Mechanism (CDM), and Joint Implementation (JI). These mechanisms encourage green investments and enable Parties to reach their emissions targets efficiently and cost-effectively.

[15] FAO. The International Treaty on Plant Genetic Resources for Food and Agriculture. *FAO*, 2001. Available at: https://www.fao.org/4/i0510e/i0510e.pdf. Access on: 30 May 2024.

[16] FAO. The International Treaty on Plant Genetic Resources for Food and Agriculture. *FAO*, 2001. Available at: https://www.fao.org/4/i0510e/i0510e.pdf. Access on: 30 May 2024.

[17] FAO. The International Treaty on Plant Genetic Resources for Food and Agriculture. *FAO*, 2001. Available at: https://www.fao.org/4/i0510e/i0510e.pdf. Access on: 30 May 2024.

[18] United Nations Framework Convention on Climate Change (UNFCCC), May 9, 1992, 1771 U.N.T.S. 107.

Ensuring food security is linked to the implementation of the right to food which is mentioned in the core international human rights instruments under the auspice of the United Nations[19]. Right to food is mentioned under Art. 25 of UDHR stating the right to an adequate standard of living. It is more clearly mentioned under Art. 11(1) of ICESCR stating the right to Adequate Food and mentioned under Art.11(2) of ICESCR stating the fundamental right of everyone to be free from hunger. The interpretations of the right to food are also inferred in other International Conventions such as the Convention on the Elimination of All Forms of Discrimination against Women, 1979[20], the Convention on the Rights of the Child, 1989[21], and the Convention on the Rights of Persons with Disabilities, 2006[22]. It is also mentioned in other regional documents such as the Additional Protocol to the American Convention on Human Rights in the area of Economic, Social, and Cultural Rights[23], known as the Protocol of San Salvador, 1988, the African Charter on the Rights and Welfare of the Child, 1990[24] and the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa, 2003[25]. Additionally, food security is a central component of the United Nation's 2030 Agenda for Sustainable Development and is explicitly mentioned in the Sustainable Development Goal (SDG) 2: 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture"[26].

Accordingly, the right to food is not only the right to enjoy the least amount of food containing calories, protein, and other specific nutrients but also the right to food that is nutritious for one's health and well-being, and the right to food. convenient to reach them. At the same time, Article 11 of ICESCR affirms that

> the States Parties to the present Covenant recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions. The States Parties will take appropriate steps to ensure the realization of this right, recognizing to this effect the essential importance of international co-operation based on free consent.[27]

To realize the right to food, according to experts, countries have the responsibility to respect, protect, and implement this right in practice[28]. Countries should prevent harming the environment and causing climate change which then worsens access to enough food. In addition, states have an obligation to prevent and limit violations of the right to food; At the same time, we must create favorable conditions for an environment that empowers people to produce, purchase or access food for themselves and their families[29].

[19] International Covenant on Economic, Social and Cultural Rights, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 49, U.N. Doc. A/6316 (1966), 993 U.N.T.S. 3, entered into force Jan. 3, 1976.

[20] Convention on the Elimination of All Forms of Discrimination against Women, G.A. Res. 34/180, U.N. GAOR, 34th Sess., Supp. No. 46, at 193, U.N. Doc. A/34/46, entered into force Sept. 3, 1981.

[21] Convention on the Rights of the Child, G.A. Res. 44/25, U.N. GAOR, 44th Sess., Supp. No. 49, at 166, U.N. Doc. A/44/49 (1989), entered into force Sept. 2, 1990.

[22] Convention on the Rights of Persons with Disabilities, G. A. Res. 61/106, U.N. GAOR, 61st Sess., Supp. No. 49, at 65, U.N. Doc. A/61/49 (2006), entered into force May 3, 2008.

[23] Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights, opened for signature Nov. 17, 1988, O.A.S. Treaty Series No. 69 (1999), 28 I.L.M. 1567, entered into force Nov. 16, 1999.

[24] African Charter on the Rights and Welfare of the Child, O.A.U. Doc. CAB/LEG/24.9/49 (1990), entered into force Nov. 29, 1999.

[25] Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa, O.A.U. Doc. CAB/LEG/66.6 (2003), entered into force Nov. 25, 2005.

[26] UNITED NATIONS. Transforming Our World: The 2030 Agenda for Sustainable Development. *United Nations*, 2015. Available at: https://sdgs.un.org/2030agenda. Access on: 12 June 2024.; EWOTI, Joel Belinga. Food security, Food insecurity, and International Law. *GCILS Working Paper Series*, n. 18, p. 1-45, Jan. 2024. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4709310. Access on: 20 June 2024.

[27] ICESCR. art. 11.

[28] HEINRICH BÖLL FOUNDATION. *Climate change and the right to food*: a comprehensive study. Berlin: Heinrich-Böll-Stiftung, 2009. (Publication Series on Ecology, 8). Available at: https://www.boell.de/sites/default/files/Series_Ecology_Volume_8_Climate_Change_and_the_Right_to_Food_0.pdf. Access on: 20 June 2024.; HONG YEN, Nguyen Thi; DUNG, Nguyen Phuong. Biến đổi khí hậu và vấn đề bảo đảm quyền có lương thực tại Việt Nam: thực trạng và kiến nghị [Climate change and the issue of ensuring the right to food in Vietnam: current situation and recommendations]. *Tạp chí Nghiên cứu lập pháp [Journal of Legislative Studies]*, n. 04, 476, Feb. 2023.

[29] HONG YEN, Nguyen Thi; DUNG, Nguyen Phuong. Biến đổi khí hậu và vấn đề bảo đảm quyền có lương thực tại Việt Nam: thực trạng và kiến nghị [Climate change and the issue of ensuring the right to food in Vietnam: current situation and recommendations]. *Tạp chí Nghiên cứu lập pháp [Journal of Legislative Studies]*, n. 04, 476, Feb. 2023.

3 Some of Asia countries' policies and challenges in ensuring food security in the climate change context

3.1 Nepal

Nepal is a country of diverse landscapes including plains, hills and snow-capped mountains, the mighty Himalayas. This diversity is faces climate change diversely. The melting of glaciers in the Himalayas[30], impact on biodiversity[31], drought in Terai region[32] among many other such recurring catastrophes prove the impact of climate change on a day-to-day basis. Climate change affects food security around the world and more so in countries like Nepal where vulnerable and poor population exist and get affected severely.[33] This is clearly proved in high altitude food security as seen in a report published by ICIMOD in 2021, an organization working primarily on the conservation of the Himalayas.[34] The report presented by the Intergovernmental Panel on Climate Change in 2019 warned that Nepal's agriculture depends on rains and climate change would severely affect the food security of the country.[35]

With these factual evidences we can clearly see a food insecurity lurking in Nepal soon. However, these facts have been known by the law makers and policy makers of Nepal. They have included various laws and policies interconnecting climate change and food security at times. Nepal's constitution is one of the very few constitutions around the world that ensures the right to food and food sovereignty as a fundamental right. The following sections describe the laws related to food and also, climate change interconnected to the right to food.

3.1.1 Constitution Ensuring Right to Food

The Constitution of Nepal, 2015 ensures the right to food and food sovereignty under Article 36. It states:

> Every citizen shall have the right relating to food. Every citizen shall have the right to be safe from the state of being in danger of life from the scarcity of food. Every citizen shall have the right to food sovereignty in accordance with law.[36]

Article 36 is a fundamental right guaranteed by the Constitution thereby making it a justiciable right. Under Article 133 of the Constitution, a citizen of Nepal can file a petition before the Supreme Court for violation of fundamental rights. The apex court has the power to pass appropriate orders or writs in this regard.

Apart from the explicit right to adequate food mentioned in Article 36, there are other provisions in the constitution mentioning about right to food. Article 42, Article 50, Article 51, and Article 52 have been pointed out as important provisions by the Food and Agriculture Organisation of the United Nations.[37] As per Article 47[38], "For the enforcement of the rights conferred in this Part, the State shall make legal provisions, as required, within three years of the commencement of this Constitution." As an enabling legislation for ensuring the fundamental right of right to food, the Right to Food and Food Sovereignty Act, 2018 was passed.

3.1.2 The Right to Food and Food Sovereignty Act, 2018

[30] HIMALAYAN Glaciers May Lose 75 per cent of ice by 2100: Report. *Al Jazeera*, 20 June 2023. Available at: https://www.aljazeera.com/news/2023/6/20/himalayan-glaciers-may-lose-75-per-cent-of-ice-by-2100-report#:~:text=Glaciers%20in%20Asia's%20Hindu%20Kush,originate%20in%20the%20mountainous%20region. Access on: 2 Apr. 2024.

[31] JOSHI, Abhaya Raj. Rare Snow Leopard Sighting in Nepal's Home of Tiger Puzzles Conservationists. *Mongabay*, 25 Jan. 2024. Available at: https://news.mongabay.com/2024/01/rare-snow-leopard-sighting-in-nepals-home-of-tiger-puzzles-conservationists. Access on: 2 Apr. 2024.

[32] POUDEL, Arjun. Most of Tarai is reeling under unusual mid-monsoon drought. *Kathmandu Post*, 1 Aug. 2023. Available at: https://kathmandupost.com/climate-environment/2023/08/01/most-of-tarai-is-reeling-under-unusual-mid-monsoon-drought. Access on: 2 Apr. 2024.

[33] PAUDEL, Mina Nath. Global Effect of Climate change and Food Security with Respect to Nepal. *The Journal of Agriculture and Environment*, v. 16, p. 1-20 at 9, 2015.

[34] THAPA, Sandhya; HUSSAIN, Abid. Climate change and high-altitude food security: a small-scale study from the Karnali region in Nepal. *Climate and Development*, v. 13, issue 8, p. 713-724, 2021. Available at: https://lib.icimod.org/record/34991. Access on: 2 Apr. 2024.

[35] IPCC Report and Nepal's Food Security. *Nepali Times*, 13 Aug. 2019. Available at: https://nepalitimes.com/news/ipcc-report-and-nepal-s-food-security. Access on: 2 April 2024.;
MBOW, Cheikh; ROSENZWEIG, Cynthia. Food security. *In*: IPCC Report. *IPCC*, 2019. Chapter 5. p. 437-550. Available at: https://ipcc.ch/site/assets/uploads/2019/11/08_Chapter-5.pdf. Access on: 2 Apr. 2024.

[36] NEPAL. The Constitution of Nepal. 2015. art. 36.

[37] THE RIGHT to Food Around the Globe. *FAO,* 2025. Available at: https://www.fao.org/right-to-food-around-the-globe/countries/npl/en/#:~:text=Article%2036%3A,sovereignty%20in%20accordance%20with%20law.%E2%80%9D. Access on: 2 Apr. 2024.

[38] NEPAL. The Constitution of Nepal. 2015. art. 47.

The Right to Food and Food Sovereignty Act, 2018 defines food in Section 2(d) as

> a substance that is processed or unprocessed consumable by the human being obtained from a biological source which is culturally acceptable, and this term also includes a raw material used in the preparation, processing or production of such a substance.

Section 2(e) defines and explains the main facets of food sovereignty. It ensures participation in policy formation, choice of occupation related to food, agricultural land, labour etc. and freedom from the negative impacts of "globalization or commercialisation of agricultural business". Section 2(f) states that "Food security means physical and financial access of every person to the food required for the active and healthy human life." According to The Food Security Atlas of Nepal,[39] food security has a four-dimensional framework that includes food availability, food access, utilization and stability.

Since the promulgation of the Constitution of Nepal in 2015, a federal structure was introduced in Nepal. Recognising the importance of federalism in ensuring the right to food, the Act obligates the Federal Government, Provincial Government, and local government to identify famine and take immediate measures to tackle the situation in Section 4. Section 6 provides for a Food Support Identity Card. The card is to be issued in the name of the senior most female member of the family. This is relevant in the context of gender equality and also because of the migration of men for work abroad. Section 9 mentions ensuring emergency food. The Government of Nepal can recognize some food crisis zones that may be affected by calamities like "earthquake, excessive rainfall, low rainfall, flood, landslide, inferno, epidemic, famine" in Section 10. This provision is significant in light of climate change that is affecting food security in various parts of Nepal.[40] In the same light, Section 19 specifically mentions that it is incumbent on the Government of Nepal "to adopt preventive measures for the mitigation of adverse impacts likely to be caused upon food production from climate change or of the risks that may result therefrom." Further, for the implementation of the Act, Section 21 proposes the preparation of a National Food Plan with the coordination of all three levels of government. All three levels of government have to arrange the necessary steps for increasing food production through science and development, as per Section 25.

The Act proposes institutions for implementing the Act at all three levels in Chapter 6 as National Food Council, Provincial Food Council and Local Food Coordination Committee. Creating a situation of famine, affecting the hoarded food or food for emergency support, obstructing transport of basic food, and any act contrary to this legislation is held as punishable offence under Section 40. According to the gravity of the offence, the prescribed punishment is imprisonment and fine as in Section 42. The Act covers contemporary challenging issue of food security in the times of climate change. It also lays down a mechanism apt for the federal structure of the State. Nevertheless, the issue lies with the implementation of the Act. A plethora of challenges still remain; stunted growth of children energy deficiency of women in reproductive age, Vitamin A deficiency etc.[41] Amidst these issues, a line of hope is reflected each year with the improving of Nepal's position in the Global Hunger Index. Last year, in 2023, Nepal was ranked 69th among 125 countries in the Index as compared to 81st among 121 countries in 2022.[42] There is explicit positive change in food security, but the implementation of the Act would help in mitigating the challenges of climate change.

3.1.3 Related laws and Policies on Right to Food

In February, 2016 the Ministry of Agricultural Development issued the plan titled, "Nepal: Zero Hunger Challenge National Action Plan (2016-2025)".[43] There are five strategic pillars under the plan viz. 100% access

[39] NATIONAL Planning Commission and World Food Programme. The Food Security Atlas of Nepal, Kathmandu, Nepal. 2019. p. 1.

[40] KAFLE, Shristi. Climate Change Exacerbates Food Crisis in Nepal's Poorest Region. *The Third Pole*, 13 May 2022. Available at: https://www.thethirdp ole.net/en/food/climate-change-exacerbates-food-crisis-in-nepals-poorest-region/. Access on: 2 Apr. 2024.

[41] THE NHRI Nepal Joint Submission for the Third Cycle Universal Periodic Review of Nepal: Submitted by National Human Rights Commission, National Women Commission and National Dalit Commission. *UPR-Info*, 2020. Available at: https://www.upr-info.org/sites/default/files/documents/2021-08/nhrc_nwc_ndc_upr37_npl_e_main.pdf. Access on: 20 Apr. 2024.

[42] GLOBAL Hunger Index 2024. Available at: https://www.globalhungerindex.org/nepal.html. Access on: 20 Apr. 2024.

[43] NEPAL: Zero Hunger Challenge National Action Plan (2016-2025). *FAO*, 2016. Available at: https://www.fao.org/faolex/results/details/en/c/LEX-FAOC174448. Access on: 20 Apr. 2024.

to adequate food all year round, zero stunted children less than 2 years, all food systems are sustainable, 100% increase in smallholder productivity and income and zero loss or waste of food.[44]

As seen from the promotion of agriculture and agricultural land, food security is intertwined with the agricultural sector. Therefore, the Agriculture Development Strategy (2015-2035) was created by the Government of Nepal in August 2015. The Fourth Annual Report of Joint Sector Review of the Agriculture Development Strategy was submitted in June 2023.[45] The agriculture productivity growth is lagging behind according to the report.[46] Similarly, import of food exceeds the export from Nepal showing a trade deficit. However, a positive trend showed by the report is that compared to the previous financial years, import of rice, the staple food of Nepal, has decreased by 15%.[47] This shows that self-sufficiency can be attained with more efforts in agriculture development.

With regard to linking health, nutrition and education the Multi-Sector Nutrition Plan I approved in 2012[48] and Multi-Sector Nutrition Plan approved in 2017[49] are crucial. One of the major achievements of MSNP I is the reduction of stunting from 40.5% in 2011 to 35.8% in 2016. The primary aim of MSNP II is to increase access to nutrition with coordination from three tier governments similar to what is reflected in the Right to Food and Food Sovereignty Act. Nevertheless, how to mitigate the major challenges posed by climate change has not been mentioned in MSNP.

3.1.4 Climate Change Laws and Policies of Nepal

The Environment Protection Act of 2019, National Adaptation Programme of Action (NAPA) 2010, Local Adaptation Plans for Action (LAPA) 2011, and Climate Change Policy 2019 are the laws and policies identifying and trying to mitigate the pressing problem of climate change today. The Environment Protection Act defines climate change management in Section 2(e) as "the mitigation or adaptation of problems arising as a result of climate change, and thus term also includes a totality of acts including policies, strategies, making institutional mechanisms, provision of finance, capacity building." The Act also encourages local and national adaptation plans under Chapter 4 that includes the provisions on climate change. Section 31 of the Act provides for Environment Protection Fund that can also be utilized for management of climate change. Nepal needs USD 47.4 billion for implementing priority actions related to climate change till 2050.[50]

The Climate Change Policy of 2019 has prioritized food security in Provision 8.1. The idea is to adopt climate-friendly agriculture system. As seen from the experiences around the world the inclusion of indigenous population is duly recognized in the policy by making use of traditional knowledge in agriculture. The climate impact considers that 5.5% of the population of Nepal is severe food insecure population as seen in the report on Climate Change Related Indicators of Nepal.[51] To further check and assess such vulnerabilities the maximum utilization of documents like Local Adaptation Plan for Action are urgent.

Due to the challenges in agricultural sector, people migrate to foreign countries.[52] Vice-versa migration has led to a toll on agricultural productivity. However, Nepal is an agrarian economy. Therefore, the focus of the government, civil society and private sector shall be on the promotion of agricultural productivity. As mentioned earlier, the food products are largely imported in

[44] NEPAL: Zero Hunger Challenge National Action Plan (2016-2025). *FAO*, 2016. Available at: https://www.fao.org/faolex/results/details/en/c/LEX-FAOC174448. Access on: 20 Apr. 2024.

[45] NEPAL. Ministry of Agriculture and Livestock Development. Agriculture Development Strategy (ADS). *Government of Nepal*, c2025. Available at: https://moald.gov.np/ads/. Access on: 20 Apr. 2024.

[46] NEPAL. Ministry of Agriculture and Livestock Development. Agriculture Development Strategy (ADS). *Government of Nepal*, c2025. Available at: https://moald.gov.np/ads/. Access on: 20 Apr. 2024. p. 15.

[47] NEPAL. Ministry of Agriculture and Livestock Development. Agriculture Development Strategy (ADS). *Government of Nepal*, c2025. Available at: https://moald.gov.np/ads/. Access on: 20 Apr. 2024. p. 3.

[48] NEPAL. National Planning Commission. Multi-Sector Nutrition Plan: For Accelerated Reduction of Maternal and Child Under-Nutrition in Nepal 2013-2017. *NPC*, May 2012. Available at: https://npc.gov.np/images/category/MSNP_english.pdf. Access on: 20 Apr. 2024.

[49] NEPAL. National Planning Commission. Multi-Sector Nutrition Plan 2018-2022. *NPC*, 2017. Available at: https://extranet.who.int/ncdccs/Data/NPL_B11_MSNP%20ii.pdf. Access on: 20 Apr. 2024.

[50] NEPAL. *National Adaptation Plan (NAP) 2021-2050*: Summary for Policy Makers, Government of Nepal. 2019. p. 43.

[51] NEPAL. *Climate Change related Indicators of Nepal, National Planning Commission, Central bureau of Statistics*. 2022. p. 37.

[52] NEPAL. National Planning Commission and World Food Programme. *The Food Security Atlas of Nepal, Kathmandu*. 2019. p. 31.

Nepal. The trade deficit especially with the import of rice should be reduced so that the economy also stabilizes. The three tier governments have been assigned roles for food security as well as mitigating climate change. However, the development is Kathmandu-centric and still needs to go a long way for overall development of the whole population of the country. Similarly, the promises made under the Right to Food and Food Sovereignty Act, 2018 are yet to be fulfilled. The Food Support Identity Cards are not issued. Nepal being a small country as per size and population has developed all the necessary institutions related to different sectors. These institutions rigorously work towards creation of various instruments. However, they need to liaison, so that these policies on climate change and food security actually come into operation. The role of National Human Rights Commission in recognizing the vulnerabilities, the Ministry of Forests and Environment in mitigating climate change, the United Nations, civil society all should come together to take immediate steps in the area of food security.

3.2 India

3.2.1 Green revolution

The green revolution was started by Norman Borlaug[53] globally and M.S. Swaminathan[54] in India. The green revolution is an intense act of increasing agricultural yield with the help of technology. The primary aim of the Green Revolution is to enhance productivity while alleviating food scarcity. There was a greater use of effective fertilizer, better variety of high yielding genetic seeds, usage of ground water, use of tractors, expansion of farming areas, adopting double-cropping system, etc. India achieved self-sufficiency in food grains through green revolution being introduced in 1960s and had also improved to the extent of exporting. India was able to cope up with severe drought conditions with the outcome of green revolution by ensuring food security. It is also notable that India lost its traditional millets and other indigenous crops as green revolution concentrated more on rice and wheat. There was excessive usage of chemicals in the form of fertilizers and pesticides risking the loss of soil nutrients, excessive water consumption, affecting natural vegetation, etc. Though the short term effect was positive in terms of food security, it created a long term effect over agriculture and ecology. India launched the Green Revolution Krishonnati Yojana[55] in 2005 with the goal of bolstering the agricultural sector and attaining food security[56].

3.2.2 Evolution of Public Distribution System

Public distribution system (PDS)[57] is the process in which the government provides the staples to needy at a reasonable price. This is an important policy decision of the state in ensuring food security. It had highly helped to overcome the difficulties at times of drought and famine in terms of food security and made sure that people are not being affected by food scarcity and malnutrition. Revamped Public distribution system[58] was

[53] Norman Borlaug (1914–2009) was an American agronomist and Nobel Peace Prize laureate renowned for his pivotal role in the Green Revolution, developing high-yielding wheat varieties that saved countless lives from famine and starvation. His contributions to global agriculture and food security have left an enduring legacy in the fight against world hunger. Referred from BORLAUG, Norman. *The Man Who Fed the World*: Nobel Peace Prize Laureate Norman Borlaug and His Battle to End World Hunger. [*S. l.*]: Leon Hesser ed., 2006.

[54] M.S. Swaminathan is an Indian geneticist and agricultural scientist known for his pioneering role in India's Green Revolution and his advocacy for sustainable agriculture and food security. SWAMINATHAN, M. S. The Green Revolution in India: A Perspective. *World Development*, v. 13, n. 5, p. 627-635, 1985.

[55] GREEN Revolution Krishonnati Yojana, Ministry of Agriculture & Farmers' Welfare, Government of India. *Krishijagran.com*. Available at: https://krishijagran.com/agriculture-world/11-missions-under-the-green-revolution-krishonnati-yojana-are-boosting-agriculture-in-india/. Access on: 4 May 2024.

[56] This initiative encompasses eleven schemes or missions, which are as follows: Mission for Integrated Development of Horticulture (MIDH); National Mission on Oil Seeds and Oil Palm (NMOOP); National Food Security Mission (NFSM); National Mission for Sustainable Agriculture (NMSA); Sub-Mission on Agriculture Extension (SMAE); Sub-Mission on Seeds & Planting Material (SMSP); Sub-Mission on Agricultural Mechanisation (SMAM); Sub-Mission on Plant Protection and Plant Quarantine (SMPPQ); Integrated Scheme on Agricultural Census, Economics and Statistics; Integrated Scheme on Agricultural Cooperation; Integrated Scheme on Agricultural Marketing (ISAM); National e-Governance Plan in Agriculture (NeGP-A).

[57] Historically, this system was developed during the time of Second world war when India was a colony of Britain. British government introduced the structured PDS in Bengal in 1939 wherein the entitled families are provided with fixed quantity of ration. PDS seeks to provide the essential commodities namely, rice, wheat, sugar, edibile oil, soft coke and kerosene oil. However the state governments manage to provide other essential commodities like pulses, cereals, salt, tea, etc. The functioning of PDS had undergone changes over the period of time in terms of administration, functioning, procedure, prices, etc.

[58] INDIA. Ministry of Consumer Affairs, Food & Public Distri-

introduced in 1992 to concentrate on hill, remote and inaccessible areas. The Targeted Public Distribution System, established in 1997, aimed to address the needs of economically disadvantaged segments of the population. It facilitated the identification of individuals in need and ensured the transparent and accountable distribution of food grains to them. According to the National Sample Survey Exercise, approximately 5% of the population experiences food insecurity, colloquially referred to as 'hunger.' In response to this issue, the Antyodaya Anna Yojana[59], a component of the Targeted Public Distribution System, was launched in 2000 with the primary goal of alleviating hunger among the most vulnerable sections of society. It provided for the identification of hungry population and deliver a certain quantity of food grains as fixed by the government at a highly subsidized cost to them. It was initially 25kg per family per month under this scheme and later increased to providing 35kg per family per month by 2002. Presently the PDS is regulated under the National Food Security Act, 2013.

PDS is highly useful for the country in many ways. Still then it is not free from defaults. The problems of PDS are not unique around the country. The different states in India face different and a combination of different issues. Those are inefficient identification of beneficiaries, shortage of required storage facilities, corruption, irregular supply, poor quality, etc. Amidst the flaws prevailing, it is notable to mention the significant contribution of PDS to India in overcoming the severe forms of drought in 1960s, 1970s, and 1980s. PDS remains to be an effective measure to counteract the effect of climate change. In fact, India's less concern over climate change issues is also because of the unstoppable functioning of PDS in the country. It is also to note that the Union government took effective measures under PDS lately as compared to the State governments which have understood the dire need of society and the importance of food security. The National parties in the States were overthrown by the rising regional parties via propagating the pressing needs for food security.

bution. Department of Food and Public Distribution. Revamped Public Distribution System. *DFPD,* c2025. Available at: https://dfpd.gov.in/. Access on: 4 May 2024.

[59] Antyodaya Anna Yojana. INDIA. Ministry of Consumer Affairs, Food & Public Distribution. Department of Food and Public Distribution. Revamped Public Distribution System. *DFPD,* c2025. Available at: https://dfpd.gov.in/. Access on: 4 May 2024.

3.2.3 Right to Food- Whether a Constitutional Right?

Though India does not explicitly provide the right to food in the Indian Constitution and its legislations, it has inferred the right through various Constitutional and legal provisions. This inference had been confirmed by the Supreme Court of India in its various decisions over the year. The basic rights for individuals are mentioned in the Indian Constitution under two heads, namely Part III of the Indian Constitution which is about Fundamental rights and Part IV of the Indian Constitution which is about the Directive Principles of State Policy (DPSP). Fundamental rights are basic rights that are to be compulsorily guaranteed to all individuals failure of which, can be challenged before the judiciary. Whereas, DPSP are the mere directives for the respective state governments to ensure to such rights and cannot be claimed before the judiciary on failure to ensure such rights. The socio-economic rights fall under the category of DPSP. Though many of the members of the Constituent Assembly claimed for the socio-economic rights to be categorized as Fundamental rights, it was unable to be included due to the economic and political condition of the country immediately after Independence.

The right to food is mentioned in the DPSP under the following Articles implicitly: Article 38- State to secure a social order for the promotion of the welfare of the people; Article 39- Certain principles of policy to be followed by the State; Article 39A- Equal justice and free legal aid; Article 41- Right to work, to education and to public assistance in certain cases; Article 45- Provision for early childhood care and education to children below the age of six years; and Article 47- Duty of the State to raise the level of nutrition and the standard of living and to improve public health. Though right to food is not mentioned explicitly in the above provisions, it elucidates the means and forms of providing this right. Article 21 of the Indian Constitution is a fundamental right on right to life and personal liberty. This right has a wide interpretation and one such inference from the interpretation is its inclusiveness of right to food. The Supreme Court of India has declared that Art. 21 includes right to food in various cases based on the circumstances and the interpretations in such cases[60]. It was in the case of PUCL v. Union of In-

[60] Keshavananda Bharati v. State of Kerala.; Dena Nath v. National Fertilisers Ltd.; Shantistar Builders v. Narayan Khimalal Tomate.;

dia[61], the Supreme court of India had held that right to food is a constitutional right under Art.21 of the Indian Constitution. Hence the Constitutional sources for the right to food are the protection of life, personal liberty, right to work, right to health, freedom from starvation, right to sustenance, provision of adequate nutrition, improvement of public health, standard of living, right to live with human dignity, payment of minimum wages, etc., as provided in the aforesaid Articles.

Apart from the Constitutional provisions, the right to food is ensured by the Government of India by various schemes such as follows: Public Distribution System, Integrated Child Development Services Schemes (ICDS), 1975[62], Wheat Based Nutrition Programme (WBNP), 1986[63], National Nutritional Policy (NNP), 1993[64], Mid-Day Meal Scheme, 1995[65], National Maternity Benefits Schemes- August, 1995[66], National Old Age Pension Scheme- 1995[67].etc With the passing of the National food security Act in 2013, right to food is construed to be a legal right and no longer a constitutional right. This issue is vested with the judiciary to be sought out at present for a clarification.

3.2.4 The National Food Security Act: features and shortcomings

The National Food Security Act was passed in 2013 to provide for food security in terms of adequate quantity of quality at subsidized prices. The Act intended to ensure the right to food and maintain uniformity in guaranteeing food security around the country. It was the PDS being followed by the government wherein by passing this Act there is a rights-based approach enshrined from a welfare-based approach. Though the Act is a welcoming step to bring uniformity throughout the country, it is nevertheless free from criticism. By enacting this Act, the Union government exhibits dominance over the State governments by affecting the State autonomy and hindering the established progress made by some the State governments. Some of the States in India have exemplary record of schemes and policy in distribution of staples at subsidized rates and sometimes free of cost. This progress is downed in those States by passing of this Act where the Union government has outwardly refused cooperation to continue the State's existing schemes. The identification of beneficiaries to get entitled with subsidiaries under Act is improper leaving behind many deserving beneficiaries. Therefore, the uniform and effective implementation of the Act is itself remain to be in question with these criticisms. The Act tries to ensure transparency, accountability and grievance redressal mechanism. But still corruption is not evaded from the system. The Act does not improve the food storage mechanism resulting in inadequacy and poor storage infrastructure. There had been instances of wastage of food grains because of improper storage and unscientific allocation and management measures. Last but not the least is the effect of climate change not being addressed in the Act. Climate change has caused greater effect in the agricultural yield by less rainfall, drought, and flooding. These aspects were found nowhere to be of concern in the Act.

3.2.5 Legislative and Policy aspects of Climate Change

In accordance with its reporting requirements as a party to the UNFCCC, India has committed to providing information on its implementation of the Convention. This approach aligns with the principle of common but differentiated responsibilities, taking into account each party's capabilities and specific regional and national development priorities, objectives, and circumstances. In 2012, India submitted its Second National Communication (NATCOM) to the UNFCCC. This report indicated that there might not be a significant decline in monsoon rainfall in the future, except in certain areas of the southern peninsula across various time frames, such as the 2020s, 2050s, and 2080s. The

In Re: Problems and Miseries of Migrant Workers.; Kishen Pattnayak v. State of Orissa.; Olga Tellis & Ors. vs. Bombay Municipal Corporation & Ors.; Peerless General Finance and Investment Co. Ltd. vs. Reserve Bank of India.; C.E.S.C. Ltd. vs. Subhash Chandra Bose.; P.G. Gupta vs. State of Gujarat.; Chamoli Singh & Ors. vs. State of Uttar Pradesh & Anr.; Kapila Hingorani vs. State of Bihar.

61 2003. 4 SCC 399.

62 Integrated Child Development Services Schemes (ICDS) of 1975, Ministry of Women and Child Development, Government of India, 1975.

63 Wheat Based Nutrition Programme (WBNP) of 1986, Ministry of Food and Civil Supplies, Government of India, 1986.

64 National Nutritional Policy (NNP) of 1993, Ministry of Health and Family Welfare, Government of India, 1993.

65 Mid-Day Meal Scheme of 1995, Ministry of Education, Government of India, 1995.

66 National Maternity Benefits Schemes of August 1995, Ministry of Women and Child Development, Government of India, 1995.

67 National Old Age Pension Scheme of 1995, Ministry of Rural Development, Government of India, 1995.

report also offered details on greenhouse gas emissions for the years 2000 and 2007, along with information on the impacts and vulnerabilities of key sectors like water, agriculture, natural ecosystems and biodiversity, and infrastructure.

In 2008, Prime Minister's Council on Climate Change was constituted, being chaired by the Prime Minister to coordinate national action for assessment, adaptation and mitigation of climate change. The government has also established the «Executive Committee on Climate Change» to oversee the execution of the eight National Missions under the National Action Plan on Climate Change (NAPCC). Additionally, the government is revisiting all National Missions under the NAPCC in response to recent scientific findings from the IPCC's Fifth Assessment Report and advancements in technology. Among the eight measures identified by NAPCC that seek to promote the development objectives while at the same time yielding co-benefits for addressing the climate change, the National Mission for Sustainable Agriculture expresses the concerns of food security. This mission devises strategies to make Indian agriculture more resilient to climate change by focusing on four areas crucial to agriculture in adapting to climate change, such as Dry Land Agriculture, Risk Management, Access to Information and Use of Biotechnology. The Mission requires a budget of INR 1,08,000 crore (approximately USD 17.4 billion). So far, proposals amounting to INR 13,034 crore have been approved. Additionally, 11,000 hectares of degraded land have been rehabilitated.

A new central-sector scheme called the «Climate Change Action Programme (CCAP)» was approved during the Twelfth Five Year Plan. The scheme aims to strengthen and support the capacity at both central and state levels for evaluating the impacts of climate change and developing and implementing suitable response measures. As part of the Climate Change Action Programme, the Ministry plans several scientific initiatives such as the National Carbonaceous Aerosols Programme (NCAP), Long-Term Ecological Observatories (LTEO), and Coordinated Studies on Climate Change for North East Region (CSCCNER). The Parliamentary Forum on Global Warming and Climate Change was established in 2008 and has since involved parliamentarians in discussions with specialists on global warming and climate change. The Forum's members actively participate in meetings and discussions on topics such as the impact of climate change on agriculture, the interplay between population, resources, and biodiversity concerning climate change, technology, and climate change, the National Mission on Sustainable Habitat, renewable energy challenges and priorities, recent findings in climate science, and innovative responses to climate change.

3.3 Vietnam

Vietnam is a developing country in the tropics, with many advantages for agricultural development. Vietnam's territory stretches across many latitudes, and the terrain is diverse and complex, so there are quite large differences in climate. The Vietnamese Government determines that

> Agriculture is the pillar of the economy, contributing to improving people's lives, maintaining political stability, social order and safety; Ensuring food security is one of the components of human security, a prerequisite for ensuring human rights to life[68].

As a result of previously being food insecure, Vietnam now not only meets domestic demand but also saves a substantial amount of rice for export each year[69]. Vietnam is increasingly asserting and demonstrating its position and reputation in food security and the battle against global poverty and this country has grown to become one of the world's major exporters of agricultural, forestry, and fishery products, with a total revenue

[68] THANH HÀ. Việt Nam xác định nông nghiệp là trụ đỡ của nền kinh tế [Vietnam identifies agriculture as the pillar of the economy]. *Laodong.vn*, 24 Apr. 2023. Available at: https://laodong.vn/thoi-su/viet-nam-xac-dinh-nong-nghiep-la-tru-do-cua-nen-kinh-te-1184085.ldo. Access on: 20 Mar. 2024.

[69] Trung bình các năm khoảng 4-5 triệu tấn, năm 2023 sản lượng xuất khẩu đạt trên 8,1 triệu tấn. Thông tin được công bợ tại Hội nghị do Cục Xúc tiến thương mại và Cục Xuất nhập khẩu (Bộ Công Thương) tổ chức ngày 29/2, tại Hà Nội với chủ đề: "Đánh giá tình hình xuất khẩu và định hướng công tác xúc tiến thương mại phát triển thị trường gạo năm 2024", [The annual average is about 4-5 million tons, in 2023 export output will reach over 8.1 million tons. The information was announced at the Conference organized by the Department of Trade Promotion and the Department of Import-Export (Ministry of Industry and Trade) on February 29, in Hanoi with the theme: ASSESSING the export situation and working orientation trade promotion to develop the rice market in 2024. *Dangcongsan.vn*, 29 Feb. 2025. Available at: https://dangcongsan.vn/kinh-te/xuat-khau-gao-nam-2023-dat-4-6-ty-usd-660339.html#:~:text=(%C4%90CSVN)%20%2D%202023%20l%C3%A0%20n%C4%83m,qu%C3%A2n%20%C4%91%E1%BA%A1t%20575%20USD%2Ft%E1%BA%A5n. Access on: 20 Mar. 2024.

of over 53 billion USD in 2022 and a presence in 196 nations and territories[70].

3.3.1 Climate change: a big challenge for Vietnam in ensuring food security

Vietnam is one of the most sensitive countries to climate change, hence climate change poses a threat to Vietnam's food security in the short and long term[71]. According to Maplecroft's 2014 assessment based on the Climate Change Vulnerability Index (CCVI), Vietnam is in the group of 30 «extremely risky» countries in the world[72]. Climate change predictions for Vietnam demonstrate that the climate in all regions of the country has been changing dramatically, with a rising warming trend in recent decades and everyday rainfall. increases year after year, although the trend varies by area; sea levels are rising... This has had a negative effect on Vietnam's food security. First of all, rising temperatures and drought will affect the distribution of crops, especially reducing productivity. Rising temperatures cause spring rice yields to fall more quickly than summer rice yields; winter corn production tends to grow in the Northern Delta while decreasing in the Central and Southern regions[73]. Second, climate change has altered the rainy season in Vietnam, making it difficult to manage water resources for crops. Studies on the impact of climate change on river flows in Vietnam demonstrate that with increased warmth and evaporation, flow increases in the flood season, generating more severe floods, and drops in the dry season, causing more severe drought. Third, extreme weather phenomena such as storms, droughts, thunderstorms, tornadoes, floods, flash flood and landslides have severely damaged food crops and people's property. At the same time, it complicates the process of growing rice and other food crops, raising agricultural production costs and contributing to increased poverty. According to the World Resources Institute's examination of the impact of floods on GDP, Vietnam ranked fourth out of 164 nations surveyed in terms of the substantial negative effects of floods on the entire economy, accounting for a 2.3% loss of GDP per year... In 2019, natural catastrophes caused damage to 40,017 hectares of food crops around the country. In 2020, damage totaled 209,378 hectares. This demonstrates that the damage caused by natural disasters in 2020 is significantly higher than in 2019[74]. Fourth, floods and increasing sea levels will result in the loss of significant amounts of agricultural land. Currently, Vietnam has around 9.4 million hectares of agricultural land (including 4 million hectares of rice land). If sea levels rise by one meter, Vietnam will lose almost 2 million hectares of rice land (around 50%)[75]. Additionally, saline intrusion in coastal locations will reduce agricultural land. Because the Red River Delta and the Mekong Delta are lowlands in comparison to sea level, salt will harm a large amount of their agricultural land. Lastly, together with the effects of climate change, the Covid-19 pandemic has jeopardized food security and worsened starvation. The implementation of extreme measures to restrict the virus's spread worsened unemployment and poverty[76].

[70] According to the: VIETNAM. Ministry of Agriculture and Rural Development. *Report of the Center for Digital Transformation and Agricultural Statistics*. Available at: https://www.mard.gov.vn/Pages/bao-cao-thong-ke.aspx. Access on: 20 Mar. 2024.

[71] VIETNAM Climate Change Country Profile. *USAID*, 2022. Available at: https://www.usaid.gov/climate/country-profiles/vietnam#:~:text=Vietnam%20is%20one%20of%20the,long%2C%20densely%20populated%2C%20coast. Access on: 10 Apr. 2024.

[72] CLIMATE change and environmental risk atlas. *Maplecroft*, 2014. Available at: http://maplecroft.com/portfolio/new-analysis/2013/10/30/31-global-economicoutputforecast-face-high-or-extreme-climate-change-risks-2025- maplecroftrisk-atlas/. Access on: 20 Mar. 2024.

[73] NGUYEN, D. Q.; RENWICK, J.; MCGREGOR, J. Variations of surface temperature and rainfall in Viet Nam from 1971 to 2010. *International Journal of Climatology*, v. 34, n. 1, p. 249-264, 2013. NGÀNH NÔNG nghiệp chịu tác động trước biến đổi khí hậu [The agricultural sector is affected by climate change]. Báo Điện tử Đảng cộng sản Việt Nam [Electronic Newspaper of the Communist Party of Vietnam]. *Dangcongsan.vn*, 15 nov. 2023. Available at: https://dangcongsan.vn/xay-dung-xa-hoi-an-toan-truoc-thien-tai/nganh-nong-nghiep-chiu-tac-dong-truoc-bien-doi-khi-hau-652330.html. Access on: 20 Mar. 2024.

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[75] VIỆN KHOA HỌC. Khí Tượng Thủy Văn Và Môi Trường. *Biến đổi khí hậu và tác động ở Việt Nam [Climate change and impacts in Vietnam]*. Hà Nội: Viện Khoa Học, 2010. Available at: http://csdl.dcc.gov.vn/upload/csdl/2008923579_1.-Bien-doi-khi-hau-va-tac-dong-o-Viet-Nam.pdf. Access on: 23 Mar. 2024.

[76] FAO; UNDP. Integrating Agriculture in National Adaptation Plans (NAP-Ag) Programme: Viet Nam case study. *UNDP*, 2020. Available at: https://www.adaptation-undp.org/resources/experiences-integrating-agriculture-sectoral-and-national-adaptation-planning-processes. Access on: 20 Mar. 2024.

3.3.2 Vietnam's policy in ensuring food security in the context of climate change

The government of Vietnam is particularly concerned with guaranteeing food security as well as dealing with and adjusting to climate change. Recognizing the role of food security and the challenges of climate change to national food security, Vietnam proactively takes many actions to respond to climate change. From an international perspective, at the COP26 Conference, Vietnam vowed to attain net zero emissions by 2050, demonstrating its commitment and efforts to tackle climate change. Many policies, programs and actions on climate change have been issued and implemented such as Resolution No. 24-NQ/TW dated June 3, 2013 of the Central Executive Committee on proactively responding to climate change. climate change, strengthening resource management and environmental protection; Environmental Protection Law No. 72/2020/QH14 is an important legal basis shaping the transformation of the development model from «brown» to «green». The Chapter on responding to climate change in this Law specifies climate change adaptation, greenhouse gas emission reduction, ozone layer protection, and response content integration in detail. Responding to climate change through policies and planning, national climate change databases, and national climate change reporting; implementing international climate change and ozone layer protection obligations. Implementing the Law, the Government has issued a Decree regulating GHG emissions mitigation and ozone layer protection (Decree No. 06/2022/ND-CP dated January 7, 2022); The Prime Minister has issued a list of GHG-emitting fields and facilities that must carry out GHG inventory (Decision No. 01/2022/QD-TTg dated January 18, 2022), Monitoring and evaluation system adaptation to climate change at the national level (Decision No. 148/QD-TTg dated January 28, 2022), Circular of the Minister of Natural Resources and Environment detailing the implementation of the Law on Environmental Protection in response to climate change (Circular Circular No. 01/2022/TT-BTNMT dated January 7, 2022). This is a key legal underpinning for implementing Vietnam's climate change obligations, as it meets the transparency standards outlined in the Code of Conduct that guides the Paris Agreement's implementation.

The strong commitments and responsible contributions of Vietnam at COP26 were highly appreciated by the international community and opened many opportunities for cooperation on low-emission growth and promoting circular economic development to adapt to climate change. In the context of climate change and new global trends, the response to climate change in our country should move to a new phase aiming to achieve global goals and should be placed in a central position, implemented effectively, substantively, and transparently, while promoting the green economy and circular economy. In addition, National Strategy on Climate Change by 2050 is developed and issued to update new international trends and identify the most urgent issues associated with the implementation of Paris Agreement and Vietnam's commitments at COP26 to achieve zero emissions by 2050. Moreover, Vietnamese Government issues Resolution 120/NQ-CP on sustainable development of the Mekong Delta for climate change adaptation (2017); Resolution 06/NQ-CP promulgating Action Plan to continue implementing Resolution No. 24-NQ/TW of 11th Party Central Committee on proactively responding to climate change, strengthening resource management and environmental protection according to Conclusion No. 56-KL/TW dated August 23, 2019 of Politburo (2021); etc. Furthermore, the government promises to eliminate hunger by 2025 by implementing the National Action Plan on «No More Hunger» approved by the Prime Minister in Decision No. 712/QD-TTg dated June 12, 2020. This is a significant step toward fulfilling the right to food in Vietnam in the face of climate change. According to this Plan, the government has worked to provide enough food for the Vietnamese people, with specific goals such as enough food, enough nutrition, lowering the rate of malnutrition in children under the age of two, developing sustainable food systems, increasing income for small-scale farmers, and eliminating food loss and waste[77].

In Vietnam, ensuring food security, responding, and adapting to climate change are top urgent concerns to the Government. Legal policies to ensure food security and adapt to climate change are emphasized and implemented in parallel. Furthermore, Vietnam's legal policies on food security, response, and adaptation to climate change are integrated and implemented synchronously with other socio-economic development

[77] DAO, T. A.; PHAM, C. N. New Challenges for Food Security in Vietnam. *FFTC Agricultural Policy Platform (FFTC-AP)*, 31 July 2020. Available at: https://ap.fftc.org.tw/article/2547. Access on: 20 Mar. 2024.

policies. However, the issue of food security in the context of climate change in Vietnam continues to face obstacles, such as: Although rice exports rank top in the world, food security ranks 46th out of 113 countries[78]. Poverty reduction is not sustainable since people easily slip back into poverty for reasons such as the harmful consequences of the Covid-19 pandemic, climate change, natural disasters.[79]; The percentage of malnutrition and stunting in children under five years old is still high (19.6%), with 38% occurring in hilly areas, while the rate of obesity is rising. Access to diversified food remains an issue in poor, mountainous or disadvantaged locations. Vietnamese people's stature is gradually improving. Improper nutrition is the major risk factor for a quick rise in diseases like cardiovascular disease, diabetes, cancer, and gout.[80]

The measures to respond and adapt to climate change are planned to be implemented on a large scale. However, disadvantaged areas and farmers in these areas with their limited access to the benefits of development are not considered. Moreover, land use and changes in land use activities make people depending on land for their livelihood more vulnerable.[81] The trend of converting land use purposes to meet socio-economic development threatens the areas of food production land, especially rice land, causing land loss and soil degradation due to acidity, desertification, saltwater intrusion, and erosion.[82]

4 Relationship between climate change, food security, and achievement of sustainable development goals in the countries

In the past two decades, the relentless march of global climate change has left an indelible mark on our planet, significantly impacting all aspects of life. This climate change, in turn, has a profound and direct influence on the ability to achieve all 17 Sustainable Development Goals (SDGs). Of these, food security is intricately linked to SDGs 1 (No Poverty), 2 (Zero Hunger), 12 (Responsible Consumption and Production), and 13 (Climate Action).

The United Nations statistics reveal that 1 in 9 people worldwide are chronically hungry, with those living in poverty bearing the brunt of this crisis. The rising temperatures from climate change, fueled by human-caused greenhouse gas emissions, are a key driver of this issue. The 'safe' limit for atmospheric carbon dioxide is set at 350 parts per million, yet in 2015, NASA recorded levels exceeding 400 parts per million. With the global population projected to exceed 9.6 billion by 2050, food demand is expected to surge by 60% to 100%. This underscores the need to enhance food production while reducing per capita emissions. Failure to act could lead to dire consequences, making this one of the most pressing challenges for societies today[83].

Climate change and food security challenges are most evident in the agricultural sector. Rising temperatures, changing rainfall patterns, and extreme weather events can cause crop failures, pest and disease outbreaks, and land and water resources degradation. These impacts will be experienced acutely and increasingly in the world's poorest regions, where rain-fed agriculture is the primary food source for millions of people. Climate impacts on agriculture and food systems pose serious food security and livelihood challenges for millions. Although agriculture is highly vulnerable to climate change, it also contributes to the adverse effects of climate change. The fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC) highlighted the importance of low-emission agricultu-

[78] GLOBAL Food Security Index 2022. *Economist Impact*, 2022. Available at: https://impact.economist.com/sustainability/project/food-security-index/explore-countries/vietnam. Access on: 23 Mar. 2024.

[79] Bộ Lao động - Thương binh và Xã hội Việt Nam [Ministry of Labor, War Invalids and Social Affairs] (2023), Kết quả rà soát hộ nghèo, hộ cận nghèo năm 2023 theo chuẩn nghèo tại Việt Nam giai đoạn 2022-2025 [Results of reviewing poor and near-poor households in 2023 according to poverty standards in Vietnam for the period 2022-2025].

[80] Bộ Y tế Việt Nam [Ministry of Health] (2021), Kết kết quả Tổng điều tra Dinh dưỡng tại Việt Nam năm 2019-2020 [Results of the Nutrition Census in Vietnam in 2019-2020].

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[82] HONG YEN, Nguyen Thi; DUNG, Nguyen Phuong. Biến đổi khí hậu và vấn đề bảo đảm quyền có lương thực tại Việt Nam: thực trạng và kiến nghị [Climate change and the issue of ensuring the right to food in Vietnam: current situation and recommendations]. *Tạp chí Nghiên cứu lập pháp [Journal of Legislative Studies]*, n. 04, 476, Feb. 2023.

[83] FOOD Security, Climate Change and the Sustainable Development Goals. *United Nations*. Available at: https://www.un.org/en/academic-impact/food-security-climate-change-and-sustainable-development-goals. Access on: 4 June 2024.

re - the sector currently employs more than 1 billion people (one-third of all workers). It accounts for up to 30% of greenhouse gas (GHG) emissions, making it the second-largest source of GHG emissions. Addressing these challenges necessitates integrated strategies that boost productivity, improve adaptive capacity, and reduce net emissions[84].

The intricate relationship between climate change and agriculture poses multifaceted challenges. However, it is essential to note that the goals of enhancing food security and rural livelihoods, and adapting to and mitigating climate change are not conflicting. When executed effectively, efforts to mitigate greenhouse gas emissions in agriculture can concurrently yield co-benefits for food security and resilience. Climate-smart agriculture, with its focus on sustainability and productivity, is a testament to this compatibility[85].

One increasingly implemented and widely embraced strategy is 'climate-smart agriculture.' This approach seeks to sustainably enhance agricultural productivity, bolster food security, build farmers' capacity to adapt to climate-related challenges, and fortify resilience to climate shocks, all while contributing to the mitigation of greenhouse gas emissions. Climate-smart agriculture employs various policy tools and techniques, such as agroforestry and conservation agriculture, and utilizes diverse technologies, including biogas programs. Moreover, it emphasizes strategic investments to transition agriculture towards a model characterized by high productivity, resilience, sustainability, and low emissions. This comprehensive approach addresses the interconnected challenges of climate change and agriculture, promoting a more sustainable and resilient agricultural sector[86].

Sustainable Development Goal (SDG) 2 seeks to «end hunger, achieve food security, improve nutrition, and promote sustainable agriculture.» Despite India's robust economic growth, the country continues to grapple with ensuring food security for its population. This issue is exacerbated by the persistently high levels of malnutrition, particularly among vulnerable groups. Climate change further aggravates the situation by negatively affecting agricultural production, increasing input costs, and undermining farmers' livelihoods. Empirical evidence reveals a strong link between agricultural productivity and extreme weather events, such as severe droughts and catastrophic floods. The World Bank highlights that India's domestic food prices closely align with global trends, especially during droughts. Consequently, India's food security challenges have a ripple effect, leading to food price inflation and affecting neighboring countries like Bangladesh, Nepal, and Sri Lanka. The spike in domestic food demand during the 2008 inflationary period was worsened by the El Niño weather phenomenon in 2009, leading to severe food shortages due to widespread drought. This situation underscores the region's interconnected nature of food security, emphasizing the need for coordinated and sustainable responses to these challenges[87].

Recent research has unveiled that the application of carbon fertilization has shown promise in mitigating the adverse effects of global warming on agricultural productivity in India. Elevated carbon dioxide levels have positively impacted crop yields, particularly in the Indian agricultural landscape. A study conducted in Karnataka has revealed the notable influence of extreme temperatures on crop production, often leading to a sharp increase in pest infestations, thus affecting the overall crop output. The comprehensive analysis indicates that climate change significantly threatens food security by reducing food availability despite the challenges posed by pest and disease attacks on crops and

[84] WORLD BANK. What You Need to Know About Food Security and Climate Change. *World Bank*, 17 Oct. 2024. Available at: https://www.worldbank.org/en/news/feature/2022/10/17/what-you-need-to-know-about-food-security-and-climate-change. Access on: 17 June 2024.

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WHAT IS Climate-Smart Agriculture? *Climate-Smart Agriculture Guide*. Available at: https://csaguide.cgiar.org/csa/what-is-climate-smart-agriculture. Access on: 17 June 2024.;
CAMPBELL, Bruce M. et al. The Role of Agriculture in the UN Climate Talks. *CGIAR*, 01 Dec. 2014. Available at: https://hdl.handle.net/10568/51665. Access on: 17 June 2024.

[86] CLIMATE-SMART agriculture. *World Bank*, 26 Feb. 2024. Available at: https://www.worldbank.org/en/topic/climate-smart-agriculture. Access on: 17 June 2024.
FAO. *Climate-Smart Agriculture Sourcebook*. 2013. Available at: https://www.uncclearn.org/resources/library/climate-smart-agriculture-sourcebook/. Access on: 17 June 2024.

[87] GOALS 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture. *UN Department of Economic and Social Affairs*. Available at: https://sdgs.un.org/goals/goal2. Access on: 17 June 2024. FOOD Security Rising Food Insecurity. *World Bank*. Available at: https://www.worldbank.org/en/topic/agriculture/brief/food-security-update. Access on: 17 June 2024.

livestock[88]. Moreover, the escalating pressure on rivers, dams, streams, and groundwater sources has been observed, particularly in the context of India's agriculture, where approximately 65% of the agricultural land relies on rainfall. This dependence makes the sector especially vulnerable to water scarcity, and widespread areas in the country are currently grappling with water shortages due to diminishing groundwater resources and increasing depletion. The disruptive impact of weather-related disasters further underscores the urgent need for a well-rounded approach to effectively allocate social resources. Therefore, undertaking pivotal research in this domain is not just critical, but urgent, in fortifying the agricultural sector and communities against current and future agrarian crises[89].

In Nepal, the agricultural sector is vital, contributing about one-third of the country's Gross Domestic Product and providing direct or indirect employment for around two-thirds of the population. However, this sector is highly vulnerable to the effects of climate change, which significantly impacts SDGs such as poverty reduction and food security. It's imperative to integrate climate change considerations into agricultural planning at local, provincial, and federal levels, given the significant impact on the livelihoods of many people dependent on agriculture. The Government of Nepal has taken important steps to include climate change in sector-specific planning and budgeting, ensuring that development programs effectively address climate-related challenges[90].

Nepal's federal system of governance establishes three tiers of government – federal, provincial, and local – comprising seven provincial authorities and 753 local governing bodies. Each tier is uniquely responsible for independently devising plans and executing development initiatives. The government's pursuit of the SDGs relies heavily on the capacity of local administrations to provide essential public services. Conforming to the restructured federal governance system and the SDGs roadmap, there is a pressing need to expand efforts to incorporate climate change considerations into agricultural development plans and budgets at the grassroots level[91].

Adapting to the impacts of climate change requires a coordinated effort at both the national and local levels, involving the government and society at large. By taking an integrated approach to climate adaptation, communities can develop more effective and long-lasting solutions to address the challenges of climate change. Achieving national targets for specific SDGs such as poverty eradication, ensuring food security, improving health, promoting gender equality, and encouraging responsible consumption and production is closely connected to progress towards SDG 13 on climate action. For instance, changes in agricultural productivity can have significant implications for food security and nutrition, particularly for the most vulnerable populations. Therefore, it is essential to identify the risks associated with climate change and develop plans to assist farmers in adapting to potential shocks[92]. The government recently enacted the Climate Change Financing Framework (CCFF) and is creating a detailed plan to

[88] MURARI, Kamal Kumar; MAHATO, Sandeep; JAYARAMAN, T.; SWAMINATHAN, Madhura. Extreme Temperatures and Crop Yields in Karnataka, India. *Research Gate*, 17 Jan. 2019. Available at: https://www.researchgate.net/publication/330440396_Extreme_Temperatures_and_Crop_Yields_in_Karnataka_India. Access on: 17 June 2024. MARTINS, Bankole Olajide. The Impact of Climate Change on Food Security: A Case Study of Karnataka, India. *International Journal of Multidisciplinary Education and Research*, v. 5, issue 4, p. 26-32, 2020. Available at: https://www.researchgate.net/publication/344113018_The_impact_of_climate_change_on_food_security_A_case_study_of_Karnataka_India. Access on: 17 June 2024. BRAHMANAND, P. S. *et al.* Challenges to Food Security in India. *Current Science*, v. 104, n. 7, p. 841-846, Apr. 2013. Available at: https://www.jstor.org/stable/24092097. Access on: 17 June 2024.

[89] DOOLEY, Kim E.; ROBERTS, Grady. Agricultural Education and Extension Curriculum Innovation: the nexus of climate change, food security, and community resilience. *The Journal of Agricultural Education and Extension*, v. 26, n. 1, p. 1-3, Jan. 2020. VERMA, Rashmi. Depleting Groundwater Costs Farmers Heavily. *Down to Earth*, 9 July 2019. Available at: https://www.downtoearth.org.in/blog/water/depleting-groundwater-costs-farmers-heavily-65530. Access on: 17 June 2024.

[90] POLICY brief: SDG localization through integration of climate change in agricultural planning and budgeting at the national and sub-national levels. *UNDP*, 2 Oct. 2018. Available at: https://www.undp.org/nepal/publications/policy-brief-sdg-localization-through-integration-climate-change-agricultural-planning-and-budgeting-national-and-sub-national. Access on: 17 June 2024.

[91] SUSTAINABLE Development Goals Status and Roadmap: 2016 - 2030. *UNDP*, 21 Feb. 2018. Available at: https://www.undp.org/nepal/publications/sustainable-development-goals-status-and-roadmap-2016-2030. Access on: 17 June 2024.

[92] POLICY brief: SDG localization through integration of climate change in agricultural planning and budgeting at the national and sub-national levels. *UNDP*, 2 Oct. 2018. Available at: https://www.undp.org/nepal/publications/policy-brief-sdg-localization-through-integration-climate-change-agricultural-planning-and-budgeting-national-and-sub-national. Access on: 17 June 2024.

incorporate climate-related initiatives into development strategies and financial plans. A key aspect of this framework is the emphasis on enhancing transparency and accountability in evaluating the impact of climate--focused investments. This commitment ensures that the effectiveness of the CCFF is rigorously assessed, instilling confidence in its ability to drive sustainable development. The roadmap offers clear directives for government ministries to adopt and customize SDGs, ensuring that climate-related efforts are thoroughly integrated into plans and oversight structures aligned with the SDGs on both national and local levels[93].

Climate change has significantly impacted Vietnam, which is ranked among the top 10 countries worldwide with severe air pollution. The 2023 Voluntary National Review (VNR) Report on Vietnam's progress towards the SDGs highlights the substantial advancements made since the country's initial VNR in 2018. Vietnam has made noteworthy progress in implementing the SDGs, particularly in reducing poverty and enhancing access to clean water. However, urgent action is required to expedite efforts to achieve specific goals, especially in addressing the pressing issues of malnutrition and hunger, which demand immediate attention[94].

Vietnam has effectively implemented comprehensive poverty reduction mechanisms and policies to support those experiencing poverty (SDGs 1, 2). The country has gradually phased out free support policies, replacing them with refundable support policies with specific conditions based on the beneficiaries, their locations, and the duration of support. There has been a notable increase in targeted support policies for particular groups. As a result, Vietnam has achieved significant poverty reduction across various measurement criteria. The multidimensional poverty rate has dramatically decreased from 9.2% in 2016 to 4.3% in 2022, and the rate of multidimensional poor children has dropped from 19.1% in 2016 to 11.7% in 2020. However, the COVID-19 pandemic continues to have a negative impact on all aspects of social life. Climate change, natural disasters, storms, and floods also pose significant challenges to poverty reduction efforts. The poverty rate among ethnic minorities and social protection beneficiaries remains high, and poverty reduction outcomes are not yet sustainable. Furthermore, the disparity between rich and poor across regions and population groups persists, necessitating comprehensive and coordinated policies to address this inequality[95].

Since 2018, Vietnam has continued to implement national target programs aimed at widespread poverty reduction and hunger eradication while promoting green, safe, and responsible agriculture development. The country has been actively enhancing food safety and nutrition. Nationwide, the rate of malnutrition among children under five (including stunting, underweight, and wasting) has generally decreased. Agricultural labor productivity has improved, and the average income per capita in rural areas has gradually increased. However, the prevalence of malnutrition and stunting among children in ethnic minority areas remains high, with about 32% of ethnic minority children under five suffering from stunting. Additionally, of the over 200,000 children across the country suffering from severe acute malnutrition, most are from ethnic minorities and have not received adequate treatment[96].

Vietnam is actively taking measures to address climate change by collaborating with the international community to reduce greenhouse gas emissions and transition to a low-emission development model. The country has shown remarkable resilience and is effectively working towards achieving the goals outlined in Sustainable Development Goal 13. Notably, 87.3% of provinces and centrally run cities have developed Action Plans to implement the Paris Agreement on Climate Change, demonstrating its strong commitment to global cooperation. In July 2020, Vietnam released the National Plan to adapt to climate change for 2021-2030, with a vision extending to 2050 (Decision No. 1055/

[93] CLIMATE Change Financing Framework. *UNDP*, 14 Feb. 2018. Available at: https://www.undp.org/nepal/publications/climate-change-financing-framework. Access on: 17 June 2024.

[94] TRANG, Tran. Việt Nam đã đạt tiến bộ vượt bậc trong thực hiện các SDGs [Vietnam has made outstanding progress in implementing the SDGs]. *Tạp chí Kinh tế và Dự báo*, 24 Mar. 2023. Available at: https://kinhtevadubao.vn/viet-nam-da-dat-tien-bo-vuot-bac-trong-thuc-hien-cac-sdgs-25548.html. Access on: 17 June 2024.

[95] KHANH Vy. Rà soát quốc gia tự nguyện, Việt Nam nỗ lực thực hiện mục tiêu phát triển bền vững [Reviewing the national voluntary policy, Vietnam strives to realize sustainable development goals]. *VnEconomy*, 2023. Available at: https://vneconomy.vn/rasoat-quoc-gia-tu-nguyen-viet-nam-no-luc-thuc-hien-muc-tieu-phat-trien-ben-vung.htm. Access on: 17 June 2024.

[96] CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM [SOCIALIST REPUBLIC OF VIETNAM]. *Rà Soát Quốc Gia Tự Nguyện Thực Hiện Các Mục Tiêu Phát Triển Bền Vững (VNR) [Voluntary National Review of Implementation of the Sustainable Development Goals (VNR)]*. Hà Nội: MPI, 2023. Available at: https://fileportalcms.mpi.gov.vn/TinBai/VanBan/2023-08/VNR_Full_Final(TV).pdf. Access on: 17 June 2024.

QD-TTg), emphasizing its alignment with international commitments. Moreover, Vietnam is making significant efforts to integrate climate change adaptation into national and local socio-economic development plans by implementing the National Strategy and Action Plan on green growth. In 2022, Vietnam will update its Nationally Determined Contribution (NDC) to align with its commitments at COP26, showing its firm dedication to global efforts. Additionally, Vietnam regularly updates climate change and sea level rise scenarios, ensuring its strategies align with international standards. Despite being considered one of the countries severely affected by climate change, Vietnam continues to enhance societal resilience to natural disaster risks associated with climate change, reflecting its unwavering commitment to global climate change initiatives[97].

The agricultural sector is particularly vulnerable to the impacts of climate change. Experts predict that agricultural production in the Red River Delta may decrease by approximately 12% and by as much as 24% in the Mekong River Delta. Climate change affects the geographical areas suitable for agriculture and impacts farming productivity. A projected rise in sea levels of 1 meter could lead to a 40.5% reduction in rice cultivation in the Mekong River Delta. Therefore, it is crucial to focus on researching and implementing innovative and adaptable agricultural techniques to ensure sustainable development in the face of climate change[98].

5 Conclusion and Recommendation

According to the aforementioned analysis, climate change is becoming a major problem for all countries, particularly agricultural and emerging countries such as Nepal, India, and Vietnam. Climate change poses a significant threat to agriculture, especially food production. Crop growth and yields are at risk due to extreme heat, water scarcity, floods, and droughts. These climate variations also affect irrigation, soil quality, and natural ecosystems essential for agriculture. Furthermore, rising sea levels can lead to a reduction in arable land. As a result, climate change is projected to impact food production, raise food prices, and endanger food security. This impact is crucial for Nepal, India, and Vietnam, where agriculture is vital for poverty reduction. Despite their low greenhouse gas emissions, these countries are among the most affected by global climate change. The audience, as policymakers, agricultural experts, and stakeholders, play a crucial role in developing and implementing adaptation and mitigation strategies in agriculture to address climate change. There is compelling evidence linking agricultural productivity to the increase in extreme weather conditions, such as more frequent and severe droughts and floods.

This study highlights the potential negative impact of climate change on the agricultural sectors in Nepal, India, and Vietnam, including decreased productivity and potential food shortages. As a result, food prices are likely to rise, posing significant concerns for food security. Despite current efforts to reduce poverty and vulnerability in South Asia, our analysis suggests that the region faces substantial vulnerability by 2030 due to climate-induced changes in crop productivity. This necessitates immediate and strategic policy action to address these challenges and safeguard the region's food security and economic growth.

These countries' governments have made major efforts to develop and improve the policy and legal framework for mitigating and adapting to the effects of climate change on agriculture. Although there are still issues to be confronted and overcome, it is clear that these countries' efforts have made a significant contribution to guaranteeing food access and security, national reality, and helping to ensure the long-term viability of the international security system. Based on the common points in economic and social development and the effects of climate change, as well as the legal and practical aspects discussed above, the authors will present key recommendations on what countries should focus on to ensure people's access to food and avoid potential threats to national and international food security.

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First, it is essential for future policies to prioritize the formulation of climate change adaptation strategies in South and Southeast Asia. Nepal, India, and Vietnam are countries with agricultural economies. Therefore, the policies should include substantial investments in agricultural infrastructure, improved land use practices, adjustments to crop planting schedules, and the development of new resilient crops to high temperatures and droughts. Implementing these adaptation measures within a comprehensive climate risk management framework—which recognizes climate change-induced shifts in crop yields and the necessity of adaptation strategies—is advantageous. The effectiveness of these strategies will be greater if they become the collective responsibility of central and local governments, individuals, civil societies, and business communities[99].

Second, the focus of the government and the private sector should be on promoting agricultural productivity in parallel with sustainable agricultural development. This includes promoting the adoption of new technology in agriculture, improving productivity, and optimizing agricultural resources. In addition, the supply chain needs to operate continuously. This means elements including crops, livestock, food processing infrastructure, and all logistics systems will have to be protected.

Third, climate-smart agriculture is an all-encompassing and proactive approach that comprehensively manages diverse landscapes, including cropland, livestock, forests, and fisheries. This approach is specifically designed to effectively manage and mitigate the interconnected challenges of ensuring food security and addressing the impacts of climate change. It has evolved into a holistic and inclusive strategy with the ultimate goals of eradicating food insecurity, fostering sustainable development, and proactively addressing the complex issues related to climate change[100].

In India, there is a pressing need for policy makers and agricultural development organizations to develop comprehensive strategies that can deliver a «triple win» by improving farmers' economic prosperity and maintaining crop yields while reducing input costs. These strategies are essential for making agriculture more resilient to the impacts of climate change, thereby bolstering food security at local, national, and global levels while also working towards minimizing future greenhouse gas emissions from agricultural activities[101].

In Nepal, climate-smart agriculture programs must be specifically tailored to address the needs of vulnerable social groups, such as women and youth. By making relevant information and resources readily accessible, these programs can enhance crop productivity while improving women's working conditions. This is achieved by reducing their workload and physical burden and raising their social status. Innovative initiatives such as water harvesting, improved cattle and goat sheds, and biogas production show considerable promise in not just addressing, but alleviating the challenges faced by women in farming. However, land degradation, fragmentation, and limited resource ownership must be addressed to ensure effective planning and productivity. Consequently, the Agriculture Development Strategy plays a pivotal role in facilitating equitable access to and control over land, particularly for women and youth, thereby fostering an enabling environment for adopting and expanding climate-smart agriculture practices and technologies[102].

In Vietnam's diverse landscapes, climate change's effects manifest differently across various production systems and agroecological zones, owing to the country's complex topography, diverse soil conditions, and distinct climate characteristics. Projections indicate a concerning decline in the export of rice, coffee, and cassava due to substantial productivity losses, reinforcing the nation's looming challenges. The heightened occurrence of extreme weather events such as floods, cold spells, saltwater intrusion, and droughts underscores the pressing need to transition towards climate-smart and environmentally sustainable agricultural practices. Embracing a range of climate-smart agriculture techniques, such as intelligent water and irrigation management, enhanced crop varieties, agroforestry,

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and advanced agro-climate information services, has the potential to sustain agricultural production amidst escalating climatic risks. Nonetheless, addressing these technologies' low to moderate adoption rates will be pivotal. Tackling barriers such as the limited availability of necessary inputs, high installation expenses, financial constraints, and the need for tailored information and comprehensive support at local levels is essential for advancing the uptake of climate-smart agriculture measures.

The primary objectives of these nations are to enhance the productivity, sustainability, and fairness of their food systems, focusing on addressing environmental, social, and economic challenges across diverse agricultural landscapes. Although the concept of climate-smart agriculture is relatively recent and continuously developing, many farmers are already implementing its practices to mitigate various production risks. For widespread adoption of climate-smart agriculture, it is crucial to assess existing and prospective practices, as well as identify the institutional and financial aspects that support its implementation[103].

Fourth, the government must monitor and evaluate the execution of programs addressing climate change adaptation and mitigation, as well as food security. It is insufficient to merely implement climate change mitigation measures without evaluating the benefits and drawbacks of policies that may impede food production. When implementing mitigation and adaptation measures for land redistribution, the state should anticipate and analyze the benefits and drawbacks that will affect people's living situations[104].

Fifth, to achieve the goal of reducing greenhouse gas emissions to zero, the Government needs to promote international cooperation to seek additional financial sources to support the decarbonization plan and learn and exchange high technology to support that plan[105].

Progress toward reducing emissions and improving resilience is feasible but often entails significant societal, economic, and technological transformations. Key strategies involve optimizing water usage, enacting policies to regulate water consumption, transitioning to less water-dependent crops, and enhancing soil quality. Despite commendable strides in alleviating poverty and improving food security, India, Nepal, and Vietnam remain highly susceptible to the adverse effects of climate change, environmental deterioration, population expansion, rapid urbanization, and evolving dietary habits. The urgency of addressing these challenges is apparent, and targeted interventions are required to uphold recent positive trends. While noteworthy advancements have been made in climate change policy responses, implementing these policies remains daunting, and the development of practical solutions to address and surmount numerous obstacles is imperative.

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