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Future of Climate change: A Comparative Study and Analysis of the Impact of Climate Change

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literature review

(Gregory, P.J., Ingram, J.S. and Brklacich, M., 2005). show Climate change also impact the way our food grow and end up on our plates is getting all mixed up because of climate change. It's making it harder for farmers affecting the taste and nutrients in our food and in some cases even threatening the supply.

When it gets hotter or rains weirdly crops struggle to grow properly and some of our favorite foods might not be as easy to get Climate change may affect food systems in several ways ranging from direct effects on crop production e.g. changes in rainfall leading to drought or flooding or warmer or cooler temperatures leading to changes in the length of growing season .

(Schmidhuber, J. and Tubiello, F.N, 2007) Climate change is causing shifts in weather patterns leading to extreme events such as floods droughts and heatwaves., These changes can disrupt agricultural activities affecting crop yields and livestock production, impacts of climate change are significant however with a wide projected range (between 5 million and 170 million additional people at risk of hunger by 2080) strongly depending on assumed socio economic development, The consequences of climate change extend beyond the agricultural sector affecting various aspects of human life, including water resources, health, and infrastructure Increased frequency and intensity of extreme weather events can lead to water scarcity making it challenging for both agricultural and domestic purposes.

(Kang, Y., Khan, S. and Ma, X, 2009) Plant and crops can not adapt fast enough for climate change before take 1000 year to adapt for but rate of climate change way to fast for ecosystem to adapt the change in our ecosystem go through heavy transformation and Crop adaptability has suffered not only as a result of temperature but also because of rainfall

Because of flood and tornado and heavy rain and strong wind there wont be good place for farming .

(Hanewinkel, M., Cullmann, D.A., Schelhaas, M.J., Nabuurs, G.J. and Zimmermann, N.E., 2013)Climate change also effect land forest on of the study anticipated reduction in European forest land by the year 2100 is predicted to range from 14% to 50% upon factors such as the chosen interest rate and climate scenario This variability underscores the sensitivity of projected losses to different conditions The economic loss of this decline are considerable, amounting to several hundred billion Euros This substantial financial impact highlights the potential 2losing consequences associated with the diminishing value of forested areas in Europe.

This study said Crop models are crucial for assessing climate change's impact on food production. Testing 30 wheat crop models against field experiments revealed that while many simulated yields accurately they were less precise at higher temperatures. The ensemble median proved more reliable in predicting crop temperature responses than individual models. Extrapolating the ensemble's findings suggests that warming is already hindering yield gains in most wheat-growing locations with a projected 6% decline in global wheat production for each additional degree Celsius of temperature increase (Asseng, S., Ewert, F., Martre, P., Rötter, R.P., Lobell, D.B., Cammarano, D., Kimball, B.A., Ottman, M.J., Wall, G.W., 2015).

The study show that Climate change also poses a threat to the diversity of crops that can be grown successfully. Some crops may struggle to adapt to changing conditions leading to a reduction in the variety of foods available. This can impact global food security as well as the resilience of local communities that rely on specific crops for sustenance.

The population is supposed to grow to about 9 billion in 2050 and food requirement are expected to escalate by about 85%(Raza, A., Razzaq, A., Mehmood, S.S., Zou, X., Zhang, X., Lv, Y. and Xu, J, 2019).

(Fawzy, S., Osman, A.I., Doran, J. and Rooney, D.W., 2020) urgency of addressing climate change citing a 1.0 °C global warming due to human activities. Alarming 2018 statistics revealed 315 natural disasters affecting 68.5 million people with $131.7 billion in losses mostly from storms floods wildfires and droughts and Sectors like food water and health and infrastructure were identified as highly vulnerable the Paris Agreement's aim to limit global temperature increase to 2 °C or 1.5 °C by 2100 set the stage for discussing mitigation strategies Conventional methods targeting CO2 emissions were deemed insufficient. the lecture explored emerging technologies like negative emissions and geoengineering emphasizing the need for alternative routes. notably biogenic-based sequestration though in early development was highlighted as a potential immediate solution.

(Clayton, S.,2020) said climate change can affect how people feel It shows that extreme weather events linked to climate change can harm physical health mental health and relationships recently there's been a focus on something called climate anxiety which means feeling more worried or stressed because of climate change.

The paper says that climate anxiety is a real thing that needs attention from doctors and therapists. But it also points out that we need to understand the difference between healthy and unhealthy levels of anxiety the study wants us to know that while it's important to care about how people feel we shouldn't forget about the bigger picture the whole society needs to work together to deal with climate change. So even though we need to help individuals we also have to pay attention to what we're doing as a group to tackle climate issues .

This study found that California is facing more and stronger autumn wildfires. Over the last 40 years it got hotter by about 1 degree Celsius and saw a 30% drop in autumn rain. These changes led to a 20% increase in conditions favoring wildfires and the number of days with extreme fire-friendly weather and crucial for intense autumn wildfires, has more than doubled since the early 1980s climate models show that these changes are likely due to human-caused climate change with higher chances of extreme conditions since 1950 and extreme fire weather is increasing in both northern and southern California. The study predicts that if we don't tackle climate change the risk of severe autumn wildfires will keep rising by the end of this century it's a reminder of the need to address climate change urgently

(Goss, M., Swain, D.L., Abatzoglou, J.T., Sarhadi, A., Kolden, C.A., Williams, A.P. and Diffenbaugh, N.S.,2020).

this study talks about big floods happening in coastal areas because of climate change, they suggest a new way to figure out how bad the flood risk They look at four different situations both in the past and future and find that if storm surges and rainfall happen together the flood area in southwest Taiwan could go up by 92% Even in the best case with only storm surges it still goes up by 15% The study says that when storm surges and rainfall happen at the same time the flooding gets worse Villages that were safe before might now be at risk The study doesn't talk much about what we can do to protect these places (Hsiao, S.C., Chiang, W.S., Jang, J.H., Wu, H.L., Lu, W.S., Chen, W.B. and Wu, Y.T.,2021).

(Naumann, G., Cammalleri, C., Mentaschi, L. and Feyen, L,2021) Earth warms up due to climate change droughts in Europe will get worse causing more damage Without taking action to address climate change the annual losses from droughts in the European Union and the United Kingdom could increase from €9 billion to a whopping €65 billion by the year 2100 This is a big problem especially for the southern and western parts of Europe where farming could lose 10% of its value and On the other hand in the northern region the impact might be less severe However there's still uncertainty about how bad the droughts could get with global warming So more research is needed to better understand and predict these changes.

This study In 2012 a big storm called Hurricane Sandy hit the East Coast of the United States It caused a lot of flooding along the coast and damaged things leading to more than $60 billion in economic losses People have argued about whether climate change directly caused the storm but there's clearer evidence that rising sea level caused by human activities affecting the climate made the damage worse

To understand this better scientist simulated what would have happened if the sea levels were lower during Hurricane Sandy, They found that about $8.1 billion of the were specifically because of human caused sea level rise This also meant that more areas got flooded affecting an additional 71 thousand people (Strauss, B.H., Orton, P.M., Bittermann, K., Buchanan, M.K., Gilford, D.M., Kopp, R.E., Kulp, S., Massey, C., Moel, H.D. and Vinogradov, S., 2021).

This study show Erbil city and recent floods we found some problems The place is at risk of quick floods. The weather info shows that it usually gets 365 mm of rain each year and about 24.42 mm each month. Two big floods happened on October 30th and December 17th, 2021 with a lot of rain The rainfall intensities were 52 mm/day and 60 mm/day The issues are that some protective walls aren't finished, and the city is growing in places where water flows. This made the floods worse and caused damage Fixing these problems is important to make Erbil safer especially in areas like Zirin and Dara Too (Sissakian, V.K., Al-Ansari, N., Adamo, N., Abdul Ahad, I.D. and Abed, S.A,2022).

Another study on f global warming is not just co2 also but also methane and one of the important plant is witch is rice produce methane and research by Indi to reduce methane

From rice with out reduce production of rice, (Pathak, H, 2023)Experiments in India showed that methane emission from lowland rice fields can be reduced by 40–50% with alternate wetting and drying, certain challenges exist alternate wetting and drying can lead to variations in rice yields affecting overall crop productivity .

One of the studying show heavy storms in Ontario, Canada, we found something important about climate change. These big storms, lasting from 5 minutes to 24 hours, are happening earlier in the year. For example, between 1960 and 2017, the average time these storms hit has moved up by 44 days, with some happening as much as 86 days earlier. Different tests all agree that heavy storms are now coming sooner in the calendar year,

this change matters because it affects things like when to plant crops how to manage droughts, and how our groundwater gets replenished (Jiang, A., McBean, E., Zeng, P., Wang, Y., Chen, H., Binns, A. and Gharabaghi, B, 2023).

The climate change is global, not only effect Europe but also other country for example
In Bangladesh specific districts are grappling with severe climate risks, resulting in economic losses ranging between 520–720 million USD A significant 41.71% of the population are effect by climate change facing disruptions to their lives and livelihoods Furthermore 5.55% of the people suffer from hazard-induced sickness and injury underscoring the health implications of climate related events (Rahman, M.C., Rahaman, M.S., Biswas, J.C., Rahman, N.M.F., Islam, M.A., Sarkar, M.A.R., Islam, M.S. and Maniruzzaman, M,2023).

Another study said Rising sea levels up by almost 50 cm, threaten to submerge key Indian coastal cities such as Mumbai, Chennai, Goa, Kochi, Puducherry, Digha, and Daman. This puts around 35 to t50 million Indians at risk of fatal chronic flooding. Statistics reveal an annual displacement of 2 to 3 million people from coastal areas to inland regions in India, with the numbers on a rapid rise (Subramanian, A., Nagarajan, A.M., Vinod, S., Chakraborty, S., Sivagami, K., Theodore, T., Sathyanarayanan, S.S., Tamizhdurai, P. and Mangesh, V.L.,2023).

This study explored how to predict which species and ecosystems are most vulnerable to climate change and how to protect them. While progress has been made, many predictions overlook the role of evolution. The research found growing ability to predict some aspects of evolution, particularly how climate change affects natural selection. However, understanding the specific genes involved remains challenging. The study didn't find a clear trend in species adaptability under future climate conditions but highlighted the overall moderate adaptability. The researchers mentioned new genetic techniques but cautioned about their practicality. Despite challenges, they are optimistic about improving predictions of species' evolutionary responses to climate change, suggesting ten activities to accelerate progress

(Urban, M.C., Swaegers, J., Stoks, R., Snook, R.R., Otto, S.P., Noble, D.W., Moiron, M., Hällfors, M.H., Gómez-Llano, M., Fior, S. and Cote, J., 2024)

One of the study on rainfall driven flooding in the UK focusing on Bristol and Bath high resolution rainfall data results reveal an increase in flood hazard under climate change to estimate flood hazard, The event set consistently predicts higher flood hazard estimates (19% to 49% more) for near term and future scenarios, This highlights a critical issue in current practices for accurate rainfall variability into flood modeling for accurate risk assessment climate adaptation strategies. The study challenges existing methodologies and calls for a more advance approach to future flood risk evaluation using CPM(Archer, L., Hatchard, S., Devitt, L., Neal, J.C., Coxon, G., Bates, P.D., Kendon, E.J. and Savage, J.,2024).

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