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Climate Design for One Planet

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ABSTRACT

The Vatican Climate Summit, titled “From Climate Crisis to Climate Resilience”, was successfully held in May 2024. A landmark achievement of the Summit was the introduction and adoption of the *Planetary Protocol for Climate Change Resilience*. This comprehensive framework calls for global cooperation to enhance climate resilience through the implementation of the MAST principles—mitigation, adaptation, and societal transformation, laying the groundwork for a strategic approach to climate action. Facing the current climate challenge, it is also crucial to understand the complexity of climate change, conduct climate design, and promote educational paradigm change for future global leadership in planet stewardship.

KEYWORDS

The Vatican Climate Summit; Climate Crisis; Climate Resilience; MAST Principles; Climate Design; Planet Stewardship; Educational Paradigm

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1 A Call to Climate Resilience: The Vatican Climate Summit

The Vatican Climate Summit, titled “From Climate Crisis to Climate Resilience” (“the Summit” hereafter), was held from May 15 to 17, 2024, at Casina Pio IV in Vatican City. Organized under the guidance of the Pontifical Academy of Sciences (PAS) and the Pontifical Academy of Social Sciences (PASS), the Summit convened a diverse group of global leaders, including Pope Francis, government officials from various levels, top scientists, belief leaders, and an indigenous leader from the Amazon.[1] This event was pivotal in galvanizing global action towards climate resilience, reflecting a broad and inclusive engagement across disciplines and cultures to address the pressing challenges posed by climate change.

The Summit highlighted the alarming status quo of the climate crisis, focusing discussions on the urgent realities of global warming. Reports presented at the Summit underscored the record-breaking temperatures of recent years and projected a troubling future with potential temperature increases leading to extensive ecological and societal impacts. The current trajectory threatens significant health, safety, and economy worldwide, highlighting the

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1. In a landmark gathering at the Vatican Climate Summit, a momentous occasion unfolded as a diverse group of global leaders, signed *Planetary Protocol for Climate Change Resilience*. The Summit symbolizes a unified commitment across various sectors and cultures to address the urgent environmental challenges of our time, highlighting the global consensus on the need for immediate and robust actions to safeguard our planet for future generations. The author was also partaken in this significant event which inspired this article. This photo shows the moment Kongjian Yu and Marcelo Suárez-Orozco, Co-Chair of the Summit with the signed *Planetary Protocol for Climate Change Resilience*.

imperative need for immediate and robust actions. A landmark achievement of the Summit was the introduction and adoption of the *Planetary Protocol for Climate Change Resilience* (Fig. 1)①[2]. This comprehensive framework calls for global cooperation to enhance climate resilience through the implementation of the MAST principles—mitigation, adaptation, and societal transformation[2]—laying the groundwork for a strategic approach to climate action.

1) Mitigation: the Summit emphasized the necessity of rapid emission reductions and the implementation of strategies to decrease existing atmospheric greenhouse gases, including advancing technologies and policies that curb emissions and transition towards renewable energy sources.

2) Adaptation: recognizing the inevitability of some climate impacts, the Summit advocated for strengthening resilience across public health, infrastructure, and ecosystems, which involves preparing communities and natural systems to better withstand and recover from climate disturbances.

3) Societal transformation: this principle, calling for a cultural and educational shift towards sustainability, is perhaps the most ambitious. The Submit stresses the importance of fostering climate literacy, encouraging sustainable practices across all sectors of society, and developing partnerships that promote equity and justice in climate responses.

These MAST principles encapsulate the Summit's holistic approach to climate resilience, stressing the interdependence of environmental sustainability and social equity. The outcomes of

① The *Planetary Protocol for Climate Change Resilience* was signed by all the participants of this Summit: V. Ramanathan (PAS Academician, Co-Chair of the Protocol Document), Marcelo Suarez-Orozco (PASS Academician, Co-Chair of the Protocol Document), Joachim von Braun (President of PAS), Sr. Helen Alford OP (President of PASS), Cardinal Peter K. A. Turkson (Chancellor of PAS and PASS), Orjan Gustafsson (PAS Academician), Mohamed Hassan (PAS Academician), John Schellnhuber (PAS Academician), Virgilio Viana (PAS Academician), Hoesung Lee (Former Chair of IPCC), Gina McCarthy (Former EPA Chief, White House National Climate Advisor), Sunita Narain (Director General of CSE), Gabrielle Dreyfus (Chief Scientist of IGSD), Jeremy Farrar (Chief Scientist of WHO), Joyce Kimutai (Climate Scientist at University of Cape Town and Oxford University, IPCC Lead author on desertification), Melissa Hoffer (Climate Chief of Massachusetts), Carola Suarez-Orozco (Professor at Harvard University), Soumya Swaminathan (Former Chief Scientist of WHO, President of Swaminathan Foundation), Romina Picolotti (Former Environment Minister of Argentina, Scientist of IGSD), and Kongjian Yu (Professor at Peking University).

the Summit, aimed at guiding both immediate and long-term strategies, signify a crucial step forward in global efforts to address the climate crisis and build a more resilient future.

2 The Call for Revolutionary Change in Global Leadership Education for Planet Stewardship

Participating and being inspired by the Summit, the author has witnessed first-hand the urgent need for revolutionary changes within our institutions. This transformation is crucial not just for addressing immediate challenges but for fostering a paradigm shift in education to nurture a new generation of global leaders committed to planet stewardship.

2.1 Understanding the Complexity of Climate Change

The planet functions as a complex system, where each component interacts with and impacts the others in myriad ways. Climate change exemplifies this complexity, arising from diverse interconnected ecosystem changes. Unfortunately, traditional approaches to addressing climate issues have often been narrow and fragmented. Singular-goal solutions such as carbon-focused mitigation strategies, carbon credits, geoengineering or conventional grey-infrastructure adaptations are not only insufficient but would sometimes exacerbate the underlying issues. Such methods often fail to address the systemic nature of environmental changes, leading to unintended consequences that further complicate the ecological and social fabric of our societies.

Therefore, it requires an integrated approach to climate action that considers not only the environmental impacts, but also the socio-economic and cultural contexts. For instance, while carbon credit aims to reduce emissions, normally, it does not address the community displacement or biodiversity degradation along with large-scale environmental projects. Similarly, geoengineering solutions may alleviate the symptoms of climate change but could potentially create new environmental challenges, disrupting local climates and global ecosystems in ways we do not fully understand.

As tackling these complex issues, the role of education in developing informed, thoughtful, and proactive leaders for planet stewardship becomes increasingly significant. We must cultivate a generation of leaders who understand the complexities of the planet's ecosystems and be prepared to make decisions that prioritize long-term sustainability over short-term gains. This means integrating climate science with policy and ethics in educational systems to ensure that future leaders can devise solutions that are as comprehensive and inclusive as the problems are complex.

2.2 The Imperative for Climate Design

In response to these challenges, I advocate a comprehensive approach known as "climate design." Rooted in design thinking, it systematically tackles complex problems through innovative, holistic solutions. Climate design goes beyond mere technical fixes by integrating mitigation, adaptation, and crucially, societal transformation.

Mitigation efforts should extend beyond carbon to consider broader ecological impacts, promoting biodiversity and system resilience. Adaptation strategies should be designed to enhance the ability of communities, especially the most vulnerable, to cope with changes while preserving the integrity of local ecosystems. Crucially, societal transformation must underpin these efforts, cultivating a global mindset that values sustainability, equity, and community-led initiatives, which are critical for long-term resilience.

By fostering an integrative approach, climate design encourages the development of solutions that are both environmentally sound and socially equitable. The efforts leverage cross-disciplinary research, engage local communities in the decision-making process, and prioritize nature-based solutions that harness the inherent capabilities of natural systems to address climate challenges.

2.3 A Paradigm Shift in Education

The current global education system often resembles a labyrinth of segregated rooms, each with a different key, training students to navigate isolated paths without ever converging in a common hall. This fragmented educational paradigm breeds specialists disconnected from the broader implications of their expertise. To counter this, we must revolutionize how we educate future leaders for planet stewardship.

The new educational paradigm should focus on interconnectivity and universality, equipping students with a "universal key" that unlocks multiple doors. This key is an interdisciplinary and holistic understanding of planet stewardship that emphasizes the interconnectedness of human and ecological health. Such education will not be confined to traditional environmental science but incorporate principles of economics, sociology, and political science, etc., through the lens of sustainable development.

This transformative educational approach will prepare leaders who can think globally and act locally, recognizing that the health of local communities is inextricably linked to the global ecosystem. These leaders will be pioneers of the “One Planet” philosophy, acknowledging that a just and sustainable world is beneficial for all, not just a privileged few.

3 Conclusions

The call for a new generation of leaders equipped with holistic and integrative thinking skills is not just a necessity but urgent. As global challenges like climate change continue to evolve, so too must our approaches to leadership and education. By fostering an educational system that emphasizes comprehensive, planet-centric stewardship, we can nurture leaders capable of navigating and solving the complex problems of tomorrow. This vision for a sustainable future is what we, as part of the global community, must strive to implement.

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气候设计：为了同一个地球

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摘要

主题为“从气候危机到气候韧性”的梵蒂冈气候峰会于2024年5月成功举办，峰会的一大里程碑式成就是讨论并达成了《全球气候韧性公约》。这一综合行动纲领呼吁通过实施MAST原则（减缓、适应和社会变革）来增强气候韧性，并为气候行动的战略方法奠定基础。面对当前的气候挑战，理解气候变化的复杂性、进行气候设计，以及推动教育范式变革以培养未来地球监护的全球领导力至关重要。

关键词

梵蒂冈气候峰会；气候危机；气候韧性；MAST原则；气候设计；地球监护；教育范式

编辑 高雨婷，田乐

1 气候韧性的呼唤：梵蒂冈气候峰会

2024年5月15~17日，主题为“从气候危机到气候韧性”的梵蒂冈气候峰会于教皇比奥四世别墅举办。本次峰会由教皇科学院和教皇社会科学院主办，汇聚了全球各领域的领导者，包括教皇弗朗西斯、各级政府官员、顶尖科学家、信仰领袖，以及一位来自亚马逊的原住民领袖。[1]此次活动是推动全球气候韧性行动的关键举措，就如何共同应对气候变化带来的紧迫挑战进行了跨学科、跨文化的广泛讨论。

峰会强调了气候危机的严峻现状和全球变暖问题的紧迫性。会议报告展示了近年来不断刷新纪录的高温事件，并预测了未来温度上升或将导致的广泛生态和社会影响。当前，亟需强有力的行动来应对这一态势在全球范围内带来的健康、安全和经济威胁。峰会的一大里程碑是讨论并达成了《全球气候韧性公约》（图1）① [2]。这一综合行动纲领呼吁通过实施MAST（减缓、适应和社会变革）原则[2]来增强气候韧性，并为气候行动的战略和方法奠定了基础。

1）减缓：峰会强调了迅速减排和实施减少现有大气中温室气体策略的必要性，包括遏制碳排放和促进向可再生能源过渡的技术发展及政策制定。

2）适应：认识到某些气候影响的不可避免性，峰会倡导增强公共健康、基础设施和生态系统韧性，包括使社区和自然系统更好地抵御气候干扰并从中恢复。

3）社会变革：这或许是其中最具雄心的原则。峰会呼吁面向持续发展的文化和教育转变，强调了培养气候变化意识素养、鼓励全社会的可持续实践，并发展能够促进气候应对行动中的公平、正义的伙伴关系。

MAST原则概括了峰会所形成的增强气候韧性的整体方法，强调了环境可持续性和社会公平的相互依赖性。峰会成果旨在指导近期和长期战略计划，是全球在气候危机中迈向更具韧性未来的关键一步。

① 《全球气候韧性公约》由全体参会者共同签署，包括：V. 拉玛那森（教皇科学院院士，公约联合主席），马塞洛·苏亚雷斯 - 奥罗斯科（教皇社会科学院院士，公约联合主席），约阿希姆·冯·布劳恩（教皇科学院主席），修女海伦·奥尔福德（教皇社会科学院主席），枢机主教彼得·K. A. 图尔克森（教皇科学院与社会科学院总监），奥扬·古斯塔夫森（教皇社会科学院院士），穆罕穆德·哈桑（教皇科学院院士），约翰·尚胡贝尔（教皇科学院院士），维尔吉里奥·维亚纳（教皇科学院院士），李会晟（联合国政府间气候变化专门委员会前主席），吉娜·麦卡锡（美国前环保局局长、白宫气候顾问），苏尼塔·纳拉因（印度科学与环境中心总干事），加布里埃尔·德雷福斯（美国治理与可持续发展研究所首席科学家），杰里米·法拉（世界卫生组织首席科学家），乔伊斯·基穆泰（开普敦大学、牛津大学气候科学家，联合国政府间气候变化专门委员会“荒漠化”内容主要作者），梅丽莎·霍弗（美国马萨诸塞州气候主管），卡罗拉·苏亚雷斯 - 奥罗斯科（哈佛大学教授），苏米亚·斯瓦米内森（世界卫生组织前首席科学家、斯瓦米内森基金会主席），罗米娜·皮科洛蒂（前阿根廷环境部长、美国治理与可持续发展研究所科学家），俞孔坚（北京大学教授）。

2 呼唤地球监护人才培养的教育变革

作为这次峰会的见证者并受峰会的触动，笔者深切感受到气候危机时代对教育机构变革的紧迫需求。这种变革不仅是为了应对当前迫在眉睫的挑战，更是为了转变教育范式，以利于培养致力于地球监护的新一代全球领导者。

2.1 理解气候变化的复杂性

地球作为一个复杂的系统，其各个组成部分以纷繁多样的方式相互作用影响。气候变化正是这种源自各种相互关联生态系统变化之复杂性的典型例证。不幸的是，解决气候问题的传统方法往往是狭隘、片面的。单一目标的解决方案，如以碳为中心的减缓策略、碳信用、地球工程或传统的灰色基础设施等，不仅不能充分解决问题，有时还会引发潜在问题。此类方法往往未能体现环境变化的系统性特征，并可能导致意想不到的后果，使我们社会的生态和社会结构进一步复杂化。

因此，我们需要采取综合的气候行动方法，不仅要考虑环境影响，还要考虑社会经济和文化背景。例如，虽然碳信用旨在减少排放，但通常无法解决大型环境项目带来的潜在社区迁移或生物多样性退化问题。同样，地球工程解决方案或许能够缓解气候变化问题，但也可能产生新的环境挑战，以我们尚且无法完全理解的方式扰乱当地气候和全球生态系统。

在应对复杂问题时，教育在培养知识渊博、深思熟虑和积极主动的地球监护领导者方面的重要性日益彰显。我们必须培养那些了解地球生态系统的复杂性，并能优先考虑长期可持续性而非短期收益的领导者。这意味着应当在教育系统中整合气候科学、政策和伦理知识，以确保未来的领导者能够针对复杂问题制定出全面的、包容性的解决方案。

2.2 气候设计的必要性

为应对这些挑战，笔者提倡“气候设计”这一基于设计思维、通过创新思维整体地解决复杂问题的系统性方法。气候设计并非仅是技术修复，而是一种整合减缓、适应和社会变革的方法。

减缓气候变化必须超越以碳为核心的单一路径，考虑更广泛的生态影响，促进生物多样性和系统韧性；适应策略应增强社区——特别是最脆弱群体——应对变化的能力，同时保持当地生态系统的完整性；最重要的是，社会变革必须对上述气候变化行动提供支撑，培养重视可持续性、公平性和社区主导行动的“整体地球”思维方式，这是长久韧性发展的关键所在。

气候设计鼓励以综合性方法发展具备生态科学合理性且能够促进社会公平的解决方案。这些方案和方法利用跨学科研究吸引当地社区参与决策过程，优先考虑基于自然的解决方案，以运用自然系统的固有能力来应对气候挑战。

2.3 教育范式的转变

当前的全球教育系统像是一座有很多相互分隔的房间的迷宫，每个房间都有不同的钥匙，训练学生在孤立的路径上探索，而难以在一个公共大厅中汇合。这种分类式的教育方法培养出的人才与其专业领域的广泛影响不相匹配。为了应对全球气候危机这样的复杂问题，我们必须革命性地改变未来地球监护领导者的教育方式。

新的教育范式应侧重于互联性和普遍性，为学生提供一把“万能钥匙”。这把钥匙是一种对地球管理的跨学科和整体性理解，强调人类和生态健康的相互联系。这种教育不仅限于传统的环境科学，还将通过可持续发展的视角整合经济学、社会学、政治学等领域的原则。

这种创新的教育方法将培养能够在全球层面思考、在本地行动，并认识到本地社区健康与全球生态系统密不可分的领导者。这些领导者将成为践行“整体地球”理念的先锋，承认一个公正、可持续的世界将使所有人而非少数特权者受益。

3 结论

培养具备整体性和综合思维能力的新一代领导者是必要且紧迫的。随着气候变化等全球挑战的不断演变，我们对于领导力及教育的思路也必须不断发展。通过加强“整体地球”监护理念的教育，我们可以培养能够驾驭和解决未来复杂问题的领导者。这一可持续未来的愿景是我们作为全球生命共同体的一部分所必须努力实现的目标。

文前图片说明

日期 2024 年 5 月

地点 梵蒂冈城

在具有里程碑意义的梵蒂冈气候峰会上，全球各界领导者共同签署了《全球气候韧性公约》。本次峰会象征着各行各业和不同文化为应对我们这个时代所面临的紧迫环境挑战而做出的一致承诺，凸显了全球共识——需要立即采取强有力的行动，为子孙后代保护我们的地球。笔者也有幸参与了这一重要活动，并有感而成此文。图为俞孔坚和同峰会联合主席马塞洛 · 苏亚雷斯 – 奥罗斯科在签署《全球气候韧性公约》后合影留念的瞬间。