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# From “Metabolic Rift” to “Degrowth”: A Materialist Historical Interpretation of Ecological Socialism

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**SUMMARY:** *In the face of the increasingly severe structural trend of ecological crisis, this paper reconstructs the interpretive schema of ecological socialism based on the framework of historical materialism, following the two threads of “metabolic disruption” and “degrowth”, and attempts to demonstrate through textual interpretation and the organization of conceptual lineages that capital accumulation deprives the social-natural material circulation chain links and creates ecological crises through mechanisms such as spatial segregation, temporal acceleration, and value extraction, leading to an inherent imbalance in the mode of production. The essence of “degrowth” lies in reducing demand, redistributing resources, and expanding public services, which is a feasible path to achieve “metabolic restoration”. Therefore, we can emphasize public ownership and democratic resource allocation in terms of institutional support; set ecological boundaries and define basic needs of the people in terms of value constraints. On this basis, we can achieve an empirical summary of theory combined with practice, and contribute a set of normative guidelines that can engage in dialogue for China's ecological civilization construction.*

***KEYWORDS:*** *Metabolic disruption; Degrowth; Ecological socialism; Historical materialism; Green capitalism*

## 1 Introduction

The cumulative effect of problems such as pollution, loss of biodiversity, and land degradation has led to the emergence of an ecological crisis with systemic and global characteristics [1]. The expectation of achieving “green growth” through technological innovation or the market is difficult to be fully realized; however, the widespread absolute decoupling at the global scale still lacks a relatively solid research basis. Moreover, the growth itself will lead to the transfer of environmental burdens to other regions and the further expansion of inequality. In this sense, some scholars, represented by ecological Marxism, have proposed the concept of “metabolic rift”, arguing that due to the disruption of the material circulation process between human society and nature caused by capital accumulation, this is actually a result of problems within the capitalist mode of production [2].

This study establishes a logical bridge between “mechanism explanation” and “institutional substitution”. While explaining the mechanism of crisis occurrence based on the “metabolic break”, it also employs “de-growth” to design institutional substitution. In the process of building China's ecological civilization and promoting the “dual carbon” goals, the issue of ecological boundaries needs to be transformed into public order and good customs. From an ecological socialism perspective, high-quality development should be understood

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from the angles of production purpose and distribution relationship. Based on this, an attempt is made to explain the “break - de-growth - ecological socialism” chain based on historical materialism and compare the premises and limits of different theoretical paths. The theoretical contributions are as follows: First, the “social metabolism - break - repair” in “Das Kapital” and related literature documents are regarded as a discussable mechanism. Based on this, the similarities, differences, and contradictions among them are analyzed to explain how to understand social practice; Second, for the policy spectrum of de-growth, “totality constraint - redistribution - public services” is the core of this thought. The internal logical connection between it and the labor process and reproduction should be sorted out; Third, using public ownership, democratic planning, and ecological boundaries as pivots to integrate this discourse, thereby creating a theoretical interface that can be mutually translated for the Chinese ecological civilization discourse and participation in the international post-growth debate.

# 2 Literature Review and Theoretical Foundation

## 2.1 Literature Review

Based on the current research findings, in foreign studies, metabolic disruption has already covered aspects such as agriculture, marine life and climate. The world ecological criticism school holds a dualistic view on the “rupture” theory of capitalism, believing that capitalism shifts its own crises onto the “cheap nature” that expands spatially continuously [3]. The research on growth originated from a critical perspective of growthism and focused on discussions on issues such as democratic transformation and redistribution. It can be seen that the domestic academic community's understanding of the mainstream analytical frameworks of foreign countries is not yet complete. Currently, apart from the existing literature that has provided evaluations and commentaries on Foster's ecological criticism and the theory of green capitalism, there is still much to be explored in this field. However, there is still a lack of understanding regarding the frequently observed “breakage - repair - replacement” pattern of the mainstream analysis process in foreign studies.

Overall, the complementarity and inherent contradictions between traditional concepts and the “de-growth” perspective of tradition exist in both their focus areas and their differences [4]: The former can effectively explain how capital accumulation creates systemic metabolic imbalances through the means of creating urban-rural divisions, extracting the value content, and accelerating the tempo of operation. However, when confronted with the criticism of “dualism” by world ecology, it is necessary to distinguish the different historical constitutions of the relationship between “nature” and “society”.

The post-growth path proposed in this study takes the form of diversification, that is, it presents multiple possibilities at both the policy and social movement levels. However, this approach would face the situation where “norms precede practice, but there is no corresponding mechanism to support it”. Logically, this might be correct; however, if the source of the capital relations on which growth depends is not questioned, the pursuit of growth might instead become a technique for technological efficiency or austerity governance [5]. So it is not a matter of choosing one of these two paths and settling on it. Instead, it is about exploring how to integrate the “crisis mechanism” and “institutional substitution” into one, in order to find the historical materialist explanatory framework for ecological socialism.

Regarding the above disputes, this article explores the following three issues: First, how does capitalist accumulation incorporate the ecological crisis into the social metabolism through the historical generation process, transforming it into an inherent contradiction of the

production mode rather than an external emergency? Second, what are the necessary conditions in the context of political economy that ensure the implementation of the reductionist norms does not degenerate into “green austerity”, but acquires democratic legitimacy? Third, how can it be logically explained that ecological socialism can provide a path between “metabolic repair” and “deaccumulation” to solve the dual predicament of contemporary ecological crises and the unsustainable social inequality?

## 2.2 Theoretical foundation

(1) The proposal and development of the “metabolic disconnection” theory

“Metabolic Fracture” depicts the institutionalized network framework formed by the disruption of the material circulation in human society and nature caused by capitalism [6]. Based on the themes of urban-rural division and capitalist accumulation and soil nutrient loss in “Das Kapital”, Foster, starting from relevant paragraphs in “Das Kapital”, summarized the connections between these two aspects, thereby reconstructing the classic theoretical paradigm of environmental sociology and further exploring issues such as marine ecological crises and carbon cycle crises.

(2) The core proposition and controversy of the “growth-oriented” theory

“Moving towards growth” is not simply the opposite of growth; rather, it involves transforming from the current structure to a more optimal one within the ecological boundaries in order to achieve a higher quality of life. On this basis, Kallis emphasizes that this requires a shift towards institutional and value-based approaches [7]. Demaria et al. also highlighted the relationship between this and democracy, autonomy and social justice. The main focus of the debate lies in the employment losses caused by economic contraction and the fiscal issues. How should the North and South of the world share the increased and decreased responsibilities in the context of globalization, and what is the intrinsic relationship between de-growth and socialist institutional arrangements? Currently, there is still relatively little domestic research in this area, but domestic scholars have shifted from ecological criticism to political criticism.

(3) The materialist historical perspective foundation of ecological socialism

From the perspective of historical materialism, the ecological crisis should be understood at the levels of production mode and social relations. It should be grasped through the process of labor, the intermediary role of material exchange between humans and nature, and in capitalist production, the pursuit of value increase leads to reducing nature to measurable inputs and emission areas. The Capitalist Manifesto, using the labor process as its basis, clearly defined the metabolic relationship it aimed for. And the descriptions regarding the damage to the sustainable fertility of the land caused by capitalist agriculture reveal the fragmented historical foundation of such experiences [8].

Table 1 shows the statistical comparison of core theoretical foundations, core connotations, and controversies.

*Table 1: Comparison of Core Theoretical Foundations, Core Connotation, and Controversies*

| Theoretical dimension | core connotation | Representative scholars | Main Controversies |
|---|---|---|---|
| Metabolic Disruption Theory | Capitalism leads to the rupture of the material cycle between human society and nature, which is an inherent contradiction in the mode of production | Foster | Easy to fall into the dualism of nature and society, ignoring the transfer of global ecological burden |
| Growth theory | Shrinking demand within ecological boundaries, redistributing resources, and improving quality of life | Calis, Demalia | Economic contraction triggers employment and fiscal crisis: uneven distribution of responsibilities between the North and the South |
| The Foundation of Ecological Socialism Historical Materialism | Understanding the ecological crisis from the perspective of production mode and social relations, and using labor as an intermediary to achieve material exchange between humans and nature | Marx, Engels, Berkes | Lack of specific institutional implementation mechanisms at the practical level |

# 3 Research Approach and Methods

## 3.1 Theoretical Interpretation Method: Historical Materialism and Conceptual Genealogy

This article falls under the category of theoretical exposition. On one hand, it needs to provide explanations for key concepts; on the other hand, it needs to reconstruct the logical chain and make relevant value judgments. Three different methods are employed here [9]. Firstly, it examines, on a unit of production basis, how ecological crises are systematically produced under the logic of capitalist accumulation by applying the method of historical materialism. Then, it uses the method of concept taxonomy to track and investigate the translation and reinterpretation process of some basic concepts such as “Metabolism”, “Rift”, “Repair”, and “Degrowth” in different disciplines and political contexts, avoiding treating the concepts merely as static labels. Finally, it compares the “rupture” tradition in environmental sociology with the critical world ecology, on the same plane, and explores the differences in their settings regarding the “nature-society” relationship, thereby deriving the underlying methodological premises.

## 3.2 Literature analysis and case-based argumentation

According to the literature, the data used in this paper mainly fall into three categories: Firstly, reference materials, including English SSCI journal papers, which selected several classic works on metabolic discontinuity, green growth debates, and degrowth political economy; Secondly, explanatory and argumentative basis materials, mainly related to ecological Marxism and domestic discussions on degrowth issues, selected several representative Chinese core journal articles or authoritative translated literature; Thirdly, classic literature

used as the basis for conceptual reference texts, such as “The Collected Works of Marx and Engels”. In terms of the method of argumentation, it does not adopt the method focusing on a single empirical case, but rather the case-based method of “problem - mechanism - solution”, selecting agriculture - energy - urbanization as the typical field of metabolic discontinuity to illustrate how the discontinuity mechanism affects the interruption of resource circulation, spatial inequality and other ecological risks that are externalized through the actions of different departments, thereby demonstrating that the “typical field” strategy can avoid the abstraction and floating of concepts when making them concrete, while ensuring the testability of theoretical explanations [10].

# 4 The materialist historical perspective interpretation of “metabolic disconnection”

## 4.1 The textual basis of Marx's “social metabolism” theory

In his Critique of Political Economy, Marx did not merely view labor as a matter of value formation or production efficiency. Instead, he defined it at a more fundamental level as “the material transformation process between human beings and nature”, which is a kind of natural metabolic activity mediated by social forms. He pointed out that through labor, humans transform natural objects into use values that meet their needs, and at the same time, they also change their social relationships and living conditions in this process [11]. This definition implies that any mode of production is not merely a set of technical arrangements or economic systems, but rather a social mechanism that organizes the natural circulation of matter. Thus, social metabolism is not an abstract natural process, but a historical practice embedded within specific production relations and power structures. Therefore, from the perspective of social metabolism, the ecological crisis is first and foremost a systemic and structural crisis, rather than a direct manifestation of natural limits [12]. The crux of the issue is not whether human activities are “excessive”, but rather how the flow of matter and energy is incorporated into specific production relations, distribution mechanisms, and value logics. The capitalist mode of production, with its core goal of value augmentation, transforms natural metabolism from a means to meet social needs into an auxiliary process serving capital accumulation, thereby continuously expanding the scale and depth of metabolic disconnection. This also means that the root cause of the ecological crisis does not lie in the abstract human beings of the “Anthropocene”, but in the way human-nature relationships are organized and managed under a specific historical form. The basic model of social metabolism can be expressed as:

$$M = f(L, N, S) \tag{1}$$

where, $M$ is social natural material metabolism; $L$ is the labor process; $N$ is the natural material circulation; $S$ is the social relations of production.

## 4.2 Capitalist Accumulation and Metabolic Disruption: Spatial Separation and Temporal Acceleration

The typical mechanism of fragmentation is the separation between urban and rural areas. Rural areas absorb food and labor, but they adopt a non-circular method to dispose of waste, preventing the return of nutrients to the land, which makes it impossible to replenish the soil's fertility [13]. Marx referred to this as the “predatory” nature of capitalist agriculture, which

destroys the sustainable fertility of the land. Foster condensed it into a metabolic rupture resulting from commodification and profit-driven forces. On the other hand, there is a phenomenon of time acceleration: competitive enterprises, in an effort to shorten their own turnover time and increase the speed of energy circulation within themselves, excessively exploit natural resources and squeeze the reproduction rhythm of the ecosystem. The metabolic break model caused by capital accumulation can be expressed as:

$$R = C_a \left( S_s + T_a + V_e \right) \tag{2}$$

where, $R$ is metabolic rift; $C_a$ is capital accumulation; $S_s$ is spatial segregation; $T_a$ is temporal acceleration; $V_e$ is value extraction.

Figure 1 shows the mechanism diagram of metabolic disruption caused by capital accumulation

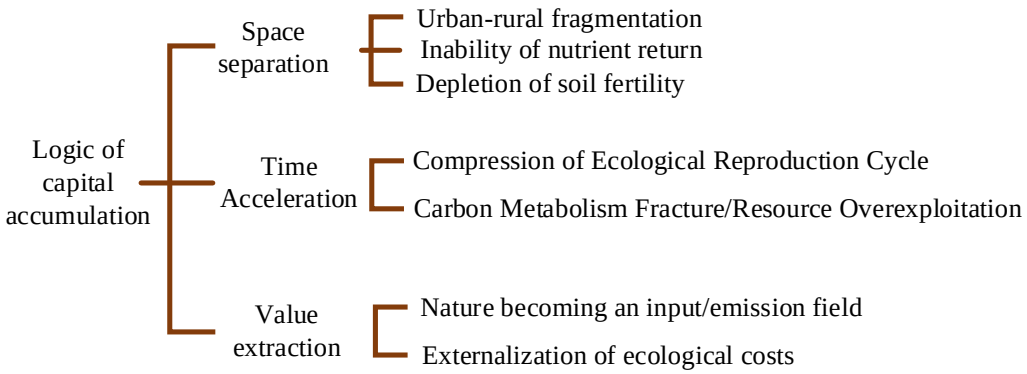


*Figure 1: Mechanism diagram of metabolic disruption caused by capital accumulation*

During this process, the geological time scale of the carbon cycle within the fossil energy system is suppressed by the accumulation logic and becomes a “carbon metabolic rupture”. Table 2 shows the core mechanisms and manifestations of metabolic disruption caused by capital accumulation.

*Table 2: Core Mechanisms and Manifestations of Metabolic Disruption Caused by Capital Accumulation*

| Fracture mechanism | Specific manifestations | Typical fields | Ecological consequences |
|---|---|---|---|
| Spatial separation | Urban and rural areas are separated, and nutrients cannot flow back to the land; Cross regional plundering of resources | Agriculture and urbanization | Soil fertility depletion and ecological spatial inequality |
| Time Acceleration | Compressing the ecological reproduction cycle and accelerating resource extraction | Energy and Fisheries | Carbon metabolism disruption, collapse of biological communities, externalization of ecological costs, systemic ecological risks |
| Value extraction | Nature has become an input and emission field for capital appreciation | Industrial and marine development | Ecological consequences |

## 4.3 The actual manifestations of metabolic disruption: Agricultural production and marine development

The industrial inputs such as fertilizers, pesticides, agricultural films, and highly mechanized equipment can achieve a short-term increase in yield through “external nutrient supply - high-density planting - large-scale operation”, but at the cost of reduced soil organic matter, structural damage, depletion of soil fertility, and subsequent pollution from non-point sources that flow into water systems, leading to eutrophication and algal blooms in rivers, lakes and reservoirs [14]. In the marine field, the fishing industry has evolved from local and seasonal livelihood activities to a demand-oriented industrial-scale and large-scale development with ocean-going fleets, cold-chain transportation, and trade in aquatic product processing. Under the reality of overfishing, these forms have led to overfishing of specific types of economic fish, causing continuous disturbances to the structure of the marine biological ecosystem, including imbalance in population age structure caused by selective fishing, collapse of the food chain due to downward fishing, destruction of habitats, and loss of stability due to by-catch. As mentioned earlier, the marine resource crisis is not a purely management failure, but an inherent tension formed due to the mismatch between the rhythm of market expansion and ecological reproduction [15].

Therefore, metabolic rupture is not merely an internal issue within a department, nor is it merely a manifestation of “inadequate technical choice”. Instead, it is the expansion of the logic of capital accumulation unfolding in different levels and with different structural characteristics [16]. The way it is realized is by shortening the duration of ecological reproduction and transferring part of the ecological reproduction costs to nature, cutting off the cycle and making the natural process a form of value augmentation. Metabolic ruptures of various forms have the same operational logic: they reshape the circulation of matter and energy according to the demands of expanded reproduction, thereby constructing in various ecosystems systems that are sustainable, recursive, irreversible, and with systematic risks that require compensation from others [17].

## 4.4 Theoretical Debate: Fragmentation and World Ecology

Based on the mechanistic explanation of “metabolic discontinuity”, the reason for the divergence between “metabolic discontinuity” and “world ecology” can be specifically manifested as the different viewpoints of the two theories regarding how nature is positioned in the history of capitalism, and how crises arise and are produced and transferred. “World ecology” holds that the discontinuity discourse may create an “externality picture”, causing people to mistakenly believe that capitalism mainly causes ecological crises through the destruction of nature, and that nature is merely an external field outside the historical process of capitalism, rather than being a material process inherently within the historical process of capitalism [18]. Capital does not operate outside of nature; instead, it organizes, mobilizes, and encodes nature to increase its own value. Therefore, this theory explains the process by which capital periodically escapes the pressure of the profit rate and transfers it to certain places or the social and ecological costs of certain individuals through spatial expansion, pioneering frontiers, and obtaining “cheap nature”. The ecological crisis is not merely the accumulation of “depletion” or “pollution”, but rather a certain state manifested by the “worldly interweaving of the system of capital, power and nature” in a specific historical period. Table 3 shows a comparison of the core differences between metabolic break theory and world ecological theory.

*Table 3: Comparison Table of Core Differences between Metabolic Fracture Theory and World Ecological Theory*

| comparative dimension | Metabolic Disruption Theory | World Ecological Theory |
|---|---|---|
| Natural positioning | Nature is the external field of capitalism | Nature is an inherent material process in the historical process of capitalism |
| Crisis generation mechanism | Capital accumulation leads to the rupture of local material circulation | Capital acquires' cheap nature 'through spatial expansion, transferring crises |
| Crisis performance | Local ecological destruction and interruption of material circulation | Global ecological inequality and spatial transfer of environmental burden |
| Core defects | Easy to form an external landscape“ | Insufficient analysis of the specific departments involved in the fracture mechanism |

This criticism brings two insights to the study of ruptures: First, “ruptures” should be regarded as a global phenomenon, not merely local ecological damage, nor merely problems with the material circulation of a certain department; second, ruptures “move outward” through the world system, through global commodity chains, cross-border energy and raw material flows, and spatial shifts of ecological burdens. In the seemingly improved environmental situation and “green transformation” in the central regions, there exist phenomena of resource extraction, land occupation, pollution transfer, and labor consumption that are transferred to peripheral or semi-peripheral regions [19]. In form, it achieves ecological improvement in the central regions and ecological degradation in the periphery, but in essence, it is still a structural distribution of ecological inequality and environmental burden. At the same time, the study of ruptures should also describe nature as being completely destroyed as an environment. The reason why capitalism can continue to develop lies in the institutionalization of natural resources being organized into certain or certain types of power that can own or obtain, and reapply, commodities like capitalism.

# 5 “Going for Growth” as an alternative to capital accumulation plan

## 5.1 The historical formation of growthism: From the worship of productivity to competition for national strength

Growthism is not a “natural law” of economic selection. It is a product of the combination of capitalist competition and state governance. Under capitalist conditions, for capital to achieve greater value appreciation, it must continuously expand the market and the circulation volume of goods. Enterprises obtain excess profits through technological innovation and increasing production scale, and thereby drive overall output growth [20]. At the same time, at the national level, it is necessary to continuously expand the tax base, maintain full employment, and strengthen international cooperation, which makes growth a form of political correctness. “Growth - Legitimacy - Competition” forms a cycle. Under this structural system, ecological constraints are often regarded as “the cost of growth”, and as long as it is not a disruptive change, it can be included in the policy agenda. Therefore, it is not surprising that the narrative of “technological substitution + efficiency improvement” for green growth emerges

without involving the purpose and distribution relationship itself.

## 5.2 Critique of the "Green Growth/Green Capitalism" Theory —— The Myth of Decoupling and Re-Commercialization

For a long time, the theoretical assumption has been that "economic growth and environmental pressure can be completely decoupled". However, in general, even in some localized areas, a relative decoupling may be achieved [21]. But on a global scale, whether it can match the growth rate and truly achieve a complete decoupling from its growth rate is still uncertain to a certain extent, especially at the level of energy and material circulation, which is even more difficult. Moreover, so-called green capitalism, through carbon markets, ecological compensation, and natural capital accounting, transforms ecological processes into a value that can bring economic benefits, which can prompt a reduction in carbon emissions in certain areas, but it may also lead to "recommodification" and "the appropriation of emission rights" situations: on one hand, social capital can obtain more green benefits through advantages in funds and technology; on the other hand, this discourse of green economy may redistribute ecological space, thereby occupying the livelihood rights of some groups [22]. Therefore, regarding the discourse of green economy as a "passive revolution" to maintain neoliberal capitalism, its core role is to continue the growthism through the renewal of discourse and minor policy amendments. Therefore, it is necessary to adopt a "subtraction approach" to growth.

## 5.3 The "growth-oriented" policy toolkit: Demand-side contraction, redistribution and public services

Reduction is not an ordinary phenomenon of wealth disparity; rather, it is a process where the demand structure and distribution rules are changed, redirecting the resources previously allocated to industries that consume high amounts of carbon, high-priced goods, and have low social benefits towards meeting public welfare and ecological restoration needs [23]. The implementation model of the growth policy can be expressed as:

$$D_g = \alpha D_d + \beta R_e + \gamma P_s \tag{3}$$

where, $D_g$ is the degrowth effectiveness; $D_d$ is the demand-side contraction; $R_e$ is the resource redistribution; $P_s$ is the public services expansion; α, β, γ are the Policy Weight Coefficients.

Figure 2 shows the implementation path of the de growth policy.

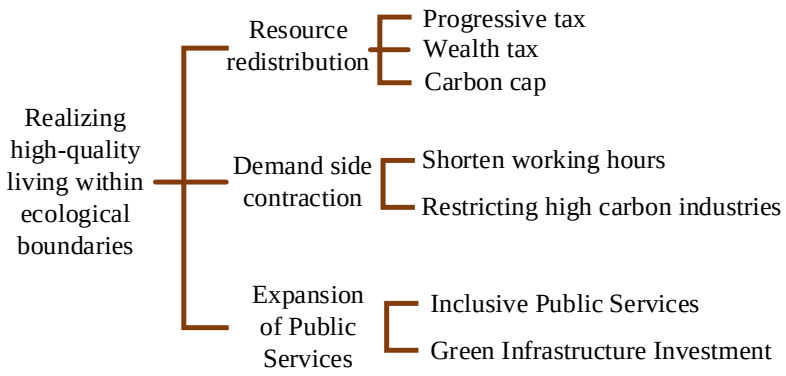


*Figure 2: Implementation Path of Growth Policy*

Policy recommendations can be summarized as reducing working hours and increasing leisure time, alleviating the structural pressure caused by the means of substituting consumption for life; implementing progressive taxation, wealth tax, and carbon caps for redistribution, so that consumption and emissions will not be dominated by more severe inequality; replacing the welfare provided by the market economy with "universal public services" to ensure the quality of life in an economic contraction context; implementing total control and industrial exit for sectors with severe pollution and large greenhouse gas emissions, and using public investment to promote the development of emerging industries such as green infrastructure and ecological restoration [24]. The combination of "welfare state - ecological transformation" distinguishes itself from "recession" or "crisis contraction" by "de-growth". Table 4 shows the core policy tools and implementation targets for de growth.

*Table 4: Core Policy Tools and Implementation Objectives for Growth Reduction*

| Policy Type | Specific tools | Core objective |
|---|---|---|
| Demand side contraction | Shorten working hours and limit the scale of high carbon and high consumption industries | Reduce ecological consumption and alleviate the pressure of consumerism |
| resource redistribution | Progressive tax, wealth tax, carbon cap | Reduce inequality and fairly distribute ecological space |
| Expansion of public services | Inclusive public services, green infrastructure public investment | Ensure the quality of life under contraction and create ecological employment |
| industrial transformation | Exit of polluting industries and investment in ecological restoration | Repair metabolic cycle and promote green transformation |

## 5.4 Towards Growth and Socialism: From "Contraction Strategy" to "Institutional Replacement"

If confined to a single policy tool, the pursuit of growth could be absorbed into the mainstream of "green austerity" policies, presenting the potential for superficial reduction through measures that compress public services; there could also be a one-way pressure of ecological responsibility onto developing countries, leading to a crisis [25]. Therefore, growth should be replaced by integrating it with the principles of publicness, planning, and redistribution in socialism, so as to truly achieve substitution. Currently, for domestic scholars, growth cannot merely expand on the basis of ecological criticism; instead, it should shift to political criticism, viewing growthism as the political expression of the logic of capital, and incorporating public decision-making and democratic governance into the alternative plan. From a materialist historical perspective, the socialist system can achieve public ownership, democratic planning, and, on this basis, shift the purpose of production from pursuing value augmentation to meeting human needs and within the social ecological boundaries, thereby providing feasible institutional guarantees for "orderly reduction" and "metabolic repair". This is also a reflection by Marx on the blind nature of social production caused by the disorderly private decisions of capitalism. When the purpose of production is in the hands of capital accumulation, ecological consequences will become externalities outside the decision-making scope; conversely, when socialized social production and distribution have social rules, the metabolic process can be re-integrated into social rationality [26].

Furthermore, there are many problems encountered when integrating growth with socialism, such as employment and social reproduction. To achieve growth, production needs to be reduced and the scale of production in certain sectors needs to be scaled back. Without a

public employment or re-training mechanism, there will be structural unemployment and a crisis in reproduction. Therefore, socialist growth places great emphasis on using public investment to create “ecological restoration employment” and adopting work-hour reduction policies to promote the redistribution of labor force; there are also fiscal issues and the transformation of local development models: Since growthism is often bundled with land finance, industrial investment promotion, and tax base expansion, when transitioning to a growth-free model, it is necessary to simultaneously promote the fiscal structure and public expenditure. If this cannot be accomplished at this time, local governments will have little motivation to transform; finally, there is the issue of global justice: From the perspective of emission reduction, socialist growth mainly targets excessive consumption and material erosion by developed countries and the large-scale flow of materials, while for developing countries, it is more about obtaining public goods that can meet a decent standard of living, such as infrastructure construction and services. Therefore, socialist growth should be discussed in conjunction with “global redistribution” and “ecological debt” issues. That is to say, high-income countries should also share advanced technologies and funds with other developing countries while taking on a larger proportion of emission reduction and resource compression. Therefore, in a sense, socialist growth is not a universal contraction slogan, but a differentiated transformation strategy based on structural inequality.

# 6 The theoretical integration of ecological socialism: From metabolic restoration to institutional substitution

## 6.1 The logical connection between “metabolic repair” and “de-growth”

The metabolic rupture reveals the structural damage that the capitalist mode of production inflicts on the social-natural cycle. However, the “revealing mechanism” does not automatically produce “alternative solutions”. Deceleration provides a transformation path that starts from both the demand side and the institutional side, and thus can be understood as a political economy form of metabolic repair. On one hand, by restricting the expansion of high-carbon and high-consumption sectors and reducing the continuous depletion of the ecosystem's regenerative capacity; on the other hand, through redistribution and the expansion of public services, it reduces the structural coercion of capitalist competition logic on individual lives, creating social conditions for “reduction without loss of well-being”. From a theoretical perspective, metabolic repair emphasizes material circulation and ecological boundaries, while deceleration emphasizes economic structure and welfare security. The combination of the two can prevent the simplification of ecological restoration to technical governance, or the simplification of economic contraction to moral initiatives.

## 6.2 The institutional pillars of ecological socialism: Public ownership, democratic planning and ecological rationality

The key to socialism lies in transforming the constraints of ecological boundaries into an inherent restraint on social production. Under capitalist conditions, market prices allocate resources based on value, and the consequences are delayed or shifted onto others due to the influence of market competition and other factors. This means that in ecological socialism, public ownership and democratic planning should be the basis, enabling it to participate in the public decision-making regarding the restructuring of important production and infrastructure (energy, transportation, housing, and land, etc.). This does not mean reverting to the planned directive system, but rather incorporating ecological boundaries, socialist needs, and

technological options into a democratic process that can be debated and monitored. In this regard, “planning” is a public rational device: reintroducing the materiality of metabolic processes back into the social decision-making. Marx Foster and Joel Burkett, when discussing ecological economics and Marxism, mentioned that the “internalization” of marketization cannot overcome the structural dynamics of capital accumulation and should seek alternative breakthroughs in its production purposes and social control structures. The integration model of ecological socialist system can be expressed as:

$$E_s = P_o \cap D_p \cap E_r \tag{4}$$

where, $E_s$ is the ecological socialism; $P_o$ is the public ownership; $D_p$ is the democratic planning; $E_r$ is the ecological rationality; $\cap$ is the institutional coupling.

Table 5 shows the core institutional pillars and practical paths of ecological socialism.

*Table 5: Core System Pillars and Practice Paths of Ecological Socialism*

| Institutional pillar | Core connotation | practical path |
|---|---|---|
| Public ownership | Social ownership of means of production, breaking the monopoly of capital on nature | Public ownership of energy, land, and infrastructure |
| Democratic Planning | Integrating ecological boundaries and social needs into public decision-making | Multi level democratic consultation and ecological budget supervision |
| Ecological rationality | Prioritize social welfare with ecological boundaries as hard constraints | Setting carbon budgets, biodiversity red lines, and defining basic needs |

## 6.3 From “Growth - Accumulation” to “Needs - Boundaries”: The Value Transformation of Ecological Socialism

The replacement of the socialist system is not merely a change in property arrangements, but also a shift in the direction of the value coordinate, that is, from the previous focus on maximizing GDP and profits, to a direction that prioritizes social reproduction, public welfare, and ecological stability. And quantitative economics precisely achieves “a decent life” by reducing people's dependence on goods and more through providing services and distribution. World ecology indicates that capitalism sustains its operation through its spatial expansion and “cheap nature”, and as an imperfect growth model, it still has the motivation to increase exploitation and prepare for future exploitation. Therefore, there are serious inequalities both externally and internally, in terms of livelihood and the environment, which requires ecological socialism to break away from the plundering of external resources, the harsh treatment of the common people, and the arbitrary exploitation of private property rights. This requires ecological socialism to focus on the principle of value transformation. First, the priority principle of ecological boundaries, setting carbon budgets, land limits, and biodiversity red lines as hard constraints; second, the priority principle of social justice, using redistribution and public services as safety valves for transformation, to prevent green transformation from becoming a thing that widens class divisions; third, the priority principle of democratic participation, including industrial exit, technological routes, and lifestyle transformation in the scope of public discussions, to prevent the limitation of social political operations from being replaced by technical bureaucrats.

# 7 Conclusions

Based on the materialist historical perspective, by integrating the two threads of “metabolic disconnection” and “de-growth”, and under the reconstructed unified overall perspective, the following conclusions are drawn: First, the separation of time and space and the increase in speed cause capital accumulation to disrupt the “social-natural” material metabolism. Second, promoting de-growth by contracting demand-side redistribution and public services is the political economy path for “metabolic repair”. Third, integrating public ownership and democratic planning is the fundamental way to achieve ecological socialism.

Reducing the growth rate does not mean giving up development; instead, it represents a further advancement in the development model towards high-quality development. This means shifting the focus of development from solely speed indicators to structural optimization, public services, and ecological boundary constraints. In the process of achieving the dual carbon goals, more consideration should be given to coordinated reforms including industrial adjustments and public service, social security systems, etc., rather than simply viewing the transformation as a replacement of theories through technology or market-based emission reduction measures.

This article mainly adopts the historical analysis method and theoretical qualitative discussion approach. Due to the lack of specific practical experience verification, future research on this topic can combine social metabolism accounting methods, carbon budgeting, and sectoral input-output models. Based on previous experiences, it can be further advanced to explore the growth-locking mechanisms such as local finance, regional development, and industrial chain dependence in the Chinese context, as well as the institutionalization paths of multi-level democratic plans.

# Author's Profile

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