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Financialization, Agro-extractivism and the role of China:  
readings from the World System Theory perspective

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## **Financialization, Agro-extractivism and the role of China: readings from the World System Theory perspective**

*Mauro Conti*

### **1 Arrighi's World System Theory perspective: cycles of capital accumulation and the actual phase of financialization**

World System Theory, as elaborated by Arrighi, defines the logic of historical systemic cycles of accumulation of capitalism as world system by applying the Marx's general formula of capital (MCM'): the cycles are alternating periods of material expansion (MC phases of capital accumulation) with phases of financial rebirth and expansion (CM' phases of capital accumulation).

The analysis of Arrighi (1994, 1999, 2007) focused on the global economic development and the command over resources based on systemic cycles of capital accumulation in the World System. Arrighi built his analysis on Braudel's conception of capitalism as the top layer of a three-tiered structure, fully dependent for its appearance and development on the power of state, in antithesis to the market economy, which constitutes the middle layer with its interconnections among different markets; finally the low layer of material life (extremely elementary and mostly self-sufficient economy).

- a) Top Layer: capitalism and state
- b) Middle Layer: market economy
- c) Low Layer: material life

So there is a clear distinction between capitalism and the world market economy, organized through many horizontal communications between different markets emerged before capitalism from the underlying layer of material life.

Assuming that world market economy rose above the non-economy structures of material life, it focuses the analysis of Arrighi on when and how capitalism emerged above the structures of the pre-existing world market economy, acquiring the power to reshape the other two layers.

In Arrighi, 3 different framework of analysis correspond to the three layers:

- a) Cycles of Accumulation: upper floor of the "anti-market" where the capitalists are meeting the political powers
- b) Market Economy, related to the circulation phase: dependency and world system theory focused on the polarization of the production in center – periphery relations
- c) The material life on labor-capital relations at the level of production

The class differentiation analysis relates to this third layer based on the internal social dynamics of a nation state, which are not affecting the top layer of the capital accumulation.

*while there may be little that most states can do to upgrade their national economies in the global hierarchy of wealth, there is always something that each can do to increase (or decrease) the well-being of its citizenry at any given level of poverty or wealth (Arrighi 2002)*

The two phases of the cycle [first phase of commercial expansion (Money – Commodity – Money+), followed by a second phase of financialization (Money – Money+)] are related with this top layer of systemic cycles of Capital Accumulation.

The passage from one phase to the other is given by the growing competition on the commercial expansion between states and agencies, which leads to a fall of the rate of profit, and a subsequent over-accumulation of capital which is not finding real opportunity of profitable investment, so it is withdrawing from real investment and search for forms of financial investments.

Arrighi derives this logic of cyclical phases of accumulation from Braudel trilogy on *Civilization and Capitalism*, which identifies historically these recurrent phases of financialization of the capital accumulation process.

*Braudel also provides a list of dates, places, and agencies that enable us to ground in world-historical space and time Harvey's theoretical considerations concerning finance capital. Braudel suggests that the withdrawal of the Dutch from commerce around 1740 to become "the bankers of Europe" was typical of a recurrent world systemic tendency. The same process was in evidence in Italy in the fifteenth century, and again around 1560, when the leading groups of the Genoese business diaspora gradually relinquished commerce to exercise for about seventy years a rule over European finances comparable to that exercised in the twentieth century by the Bank of International Settlement at Basle—"a rule that was so discreet and sophisticated that historians for a long time failed to notice it." After the Dutch, the British replicated the tendency during and after the Great Depression of 1873-96, when "the fantastic venture of the industrial revolution" created an overabundance of money capital. After the equally "fantastic venture" of so-called Fordism-Keynesianism, we may add, US capital since the 1970s has followed a similar trajectory. "[Every] capitalist development of this order seems, by reaching the stage of financial expansion, to have in some sense announced its maturity: it [is] a sign of autumn. (Arrighi, 2007pg 230)*

Arrighi applied this elaboration to the accumulation process in Marx, reading the overall passage of the Marxian general formula of capital  $MCM'$  (where Money is invested in a combination of inputs in order to produce an output Commodity, and generate an *expanded liquidity*) not as the logic of single investment, but as the logic of the full cycle of capital accumulation.

*Marx's general formula of capital ( $MCM'$ ) can therefore be interpreted as depicting not just the logic of individual capitalist investments, but also a recurrent pattern of historical capitalism as world system. A central aspect of this pattern is the alternation of epochs of material expansion (MC phases of capital accumulation) with phases of financial rebirth and expansion ( $CM'$  phases). In phases of material expansion money capital "sets in motion" an increasing mass of commodities (including commoditized labor-power and gifts of nature); and in phases of financial expansion an increasing mass of money capital "sets itself free" from its commodity form, and accumulation proceeds through financial deals (as in Marx's abridged formula  $MM'$ ). Together, the two epochs or phases constitute a full systemic cycle of accumulation( $MCM'$ ). (Arrighi, 1994, pg 6)*

The financialization phase of the cycle of accumulation suspends the trickle down effect of the commercial expansion, based on substantial social peace under the hegemonic centre of capital accumulation, even if

*in both transitions, the widening of the social foundations of the hegemonic bloc was accompanied by, indeed, premised on a de jure or de facto exclusion of the majority of the world's population from access to the same rights and privileges. (Arrighi, 1999, pg. 152)*

During the phases of financialization, there is an intensification of the inter-state and inter-enterprise competition, leading to vertical and horizontal integration of enterprises, an extension of proletarianization process, an intensification of the polarization in the society and a middle class squeeze, with a multiplication of the social conflicts. Only the emergence of a new social bloc generating a change of hegemony will be able to put under control the social conflict.

In this sense, financialization is a crucial moment for social struggles to redefine a new equilibrium of powers. The main question is how the social struggles can influence the Worldwide system of Capital Accumulation.

So it is clear that in Arrighi the financialization phase of the economy prepares a new commercial expansion under a new Hegemonic Cycle:

*(1) a first period of financial expansion in the course of which the new regime of accumulation develops within the old, its development being an integral aspect of the full expansion and contradictions of the latter;*

*(2) a period of consolidation and further development of the new regime of accumulation, in the course of which its leading agencies promote, monitor, and profit from the material expansion of the entire world-economy;*

*(3) a second period of financial expansion, in the course of which the contradictions of the fully developed regime of accumulation create the space for, and are deepened by, the emergence of competing and alternative regimes, one of which will eventually become the new dominant regime.*

The beginning of every financial expansion is designated by the leading agency's switch of its capital in increasing quantities from trade and production to financial intermediation and speculation.

This switch expresses a turning point revealing a negative judgement on the possibility of continuing to profit from the reinvestment of surplus capital in the material expansion of the world-economy, as well as a positive judgement on the possibility of prolonging in time and space its leadership/dominance through a greater specialization in high finance.

Despite the last benefits deriving the final part of the material expansion of the world-economy, the financial phase has always been the preamble to a deepening of the crisis and to the overcoming of the dominant regime of accumulation by a new one.

In its historical reconstruction, Arrighi defines 4 main hegemonic cycles of accumulation: Genoese, Dutch, British and American.

Arrighi identifies the last change of the hegemony (from United Kingdom to United States) and the new cycle of capital accumulation at the end of the Second World War.

Under British hegemony the interstate system was ensuring the operating of the international law and balance of power: there was no such a system functioning above the states and the organizations and businesses had no autonomy from the national states to rule over the interstate system.

Also the Haute Finance and the world market, operating in the *free-trade imperialism* over the heads of most states, they were not autonomous from the world power of United Kingdom, but instrument of governance of a particular state over the interstate system.

The establishment of the new hegemony was based on the proposal of Roosevelt which tried to institutionalize the idea of a United Nations world government in order to manage the process of decolonization and guaranteeing the self-determination of each national community, participating on equal footing in the UN General Assembly. The postwar order was so limiting national sovereignty of States far more than the previous British hegemony, based on free-trade imperialism and the ineffective League of Nations.

Indeed Roosevelt's idea of a world government encompassing the entire globe was overcome by the Truman's free worldism, establishing a Cold War world order, with the United States substituted itself for the UN in the governance of the world system.

US hegemony create a world order based on controlling world money and military power, with the supplementary support of the Bretton Woods institutions as IMF and World Bank, and the United Nations, which were supporting the US policies or were impeded to function. A publicly regulated dollar system, which gave the US government great freedom of action, more than the British government ever enjoyed under the privately regulated gold standard, only limited by market constraints.

The General Agreement on Trade and Tariffs (GATT) was the main instrument to support the formation of a world market under control of the US government in particular, control over the pace and direction of trade liberalization. The final outcome was not a free trade system, but a patchwork of agreements between US, Japan and Europe, and minor countries. The US regime was based on a process of “internalization” of the world market within giant domestic business organizations, leaving all US economic activities organically integrated into a single national reality to a far greater extent than they ever were during the British cycle. Foreign Direct Investment (FDI) represents the central tool of Capitalist world economy reconstruction after WWII.

The essence of direct investment by US transnational corporations has been the shift of managerial control over substantial sectors of foreign economies to American nationals. The TNCs integrate mass production and mass distribution processes within a single organization internalizing a whole sequence of sub-processes from the procurement of primary inputs to the disposal of final outputs. TNCs were in the position to subject the costs, risks, and uncertainties along the value chain in a long-term corporate planning fully administratively coordinated, increasing productivity and reducing costs.

*“US corporations began to move to foreign countries almost as soon as they had completed their continent-wide integration. . . . In becoming national firms, US corporations learned how to become international” [...] The spectacular domestic and trans-statal expansion of US multi-unit, vertically integrated business enterprises, and the organizational barriers to entry which they created, were associated with an equally spectacular growth of managerial hierarchies and bureaucratic structures. Once in place, these hierarchies and structures themselves “became a source of permanence, power and continued growth: (Arrighi, 2007, pg. 248-249)*

During the 1950s and most of the 1960s the US government had effective control over world liquidity, being able to promote and sustain a generalized expansion of world trade with few precedents in capitalist history.

Indeed, until the ‘70s US Federal Reserve System played a major role compared to IMF and World Bank in the regulation of the world money.

It was only with the crisis of US hegemony in the 1970s and, above all, in the 1980s that for the first time the Bretton Woods organizations rose to prominence in global monetary regulation. By the end of Bretton Woods agreement, TNCs were embodied into a world-scale system of production, exchange and accumulation, which was independent from any state authority and ruling the members the interstate system, including US.

TNCs had a role in the accumulation of surplus capital in European and offshore markets which put in crisis the Central Banks system regulation of the money supply in accordance with the Bretton Woods regime.

The phase of financial expansion began in 1968 with the explosive growth of (TNCs) deposits in the London-centered Eurodollar market, forcing the US government to abandon the gold-dollar exchange standard, handing over to the free forces of the market to fix the prices of national currencies. US monetary policies tried to support material expansion, but the expansive policies fuel the petrodollars and Eurodollars deposits through the private interbank mechanism of money supply.

*From the 1980s onward, nation-states have been squeezed three ways by neoliberalism: (1) 'from below' through a widespread push for political and fiscal decentralization and administrative de-concentration; (2) 'from the side' through far-reaching privatization of governance structures and responsibilities; and (3) 'from above' through globalization and the partial giving up of significant state powers to international inter-governmental and financial institutions (Borras 2016 pg 13)*

## **2 Agriculture in World System Theory's cycles of capital accumulation**

Jason W Moore expands the world system theory of Arrighi interpreting it as a Capitalistic world-ecology, keeping together in a dialectical unity the accumulation of capital and the production of nature, with a specific focus on financialization and agriculture.

Moore reads Arrighi's capitalism as an emergence through not linear and contingent relations of *humans – extra human nature*, with a continuous structurally variant form and organizational revolutions, theorizing capitalism as a world-ecology.

In the world-historical perspective, capitalistic accumulation and development strongly interconnect with biophysical transformations: in order to impose a new hegemony, the extraction of timber for the Dutch commercial fleets or the coal for the British steam engines have been crucial.

So the world historical studies intertwined “modes of extraction” (mostly in the Global South) and “modes of production” (largely in the North), or focused on the ecological footprint of capitalism.

Nevertheless, so far the worlds-systems analysis did not redefined the nature-capital categories lying at the core of its theory and methodology: the accumulation of capital was still only a social (not ecological) process, as part of the environmental history of modernity, rather than thinking modernity as a socio-ecological project and process, and reading capitalism as an environmental history. Therefore, Moore reads the social reductionism of world historical studies in narrowing the role of environment as merely consequential and not constitutive in the making and unmaking of historical capitalism.

*the short hand “ecological” speaks to a holistic perspective on the society-environment relation. Each dialectical movement is actively constructed by (and through) the other. If society and environment constitute the parts, ecology signifies the whole that emerges through these relations. (Moore, 2011, pg 114)*

All social projects are ecological project (Harvey) and viceversa, which extinguishes the Cartesian divide of capitalism versus nature, and unifies the accumulation of capital and the production of nature in one single theory of capitalism: modern world history, from industrialization and agricultural revolutions to global markets, is made by socio-ecological projects and processes.

The transformation of history of capitalism as a world ecology system is possible since the World-Historical Method at the core of the *The Long Twentieth Century* enables conceptual room for socio-ecological perspective, endogenous in the history of capitalism.

Moore focused on the Arrighi's successive *organizational revolutions* in the structures governing capitalist and territorial power, which are locating the contradictions of capital within the agencies and the hegemonic alliances

Each period of crisis emerges as exhaustion of the “organizational structures” which originated the new “material” accumulation and expansion. After a period of chaos and uncertainty, new forms of world hegemony and business organization emerged within the different Cycles of Accumulation,

revolutionizing each state-capitalist relations and creating new spaces for “organizational revolutions” of classes, states, and business organizations.

So Moore redefines the nature-capital categories lying at the core of the world-systems analysis, with the accumulation of capital as a socio-ecological process, and reading capitalism as an environmental history.

Moore assumes two key concepts : the ecological surplus and the capitalization of nature.

The ecological surplus is provided by 4 main socio-ecological relations: labour power, food, energy and non-energy inputs (metals, wood and fibres)

All these socio-ecological relations or inputs can be considered “cheap” just in relation to the organic composition of global capital – the fixed and circulating moments of constant capital.

The ecological surplus is the outcome of a mix of capitalized production (e.g. farm mechanization) and the free appropriation of nature: f.i. energy-intensive agriculture is based on the appropriation of geological production of nature as water and oil.

In this sense, there is a dialectical unity of intensive capitalization and extensive appropriation.

*For the greater part of six centuries, the relation between capitalism and agriculture has been a remarkable one. In contrast with all previous civilizations, capitalism organized a series of extraordinary expansions of the food surplus, through successive agricultural revolutions. The ‘golden ages’ of pre-capitalist civilizations invariably turned to crisis so long as cultivation remained in the hands of peasants, who were not subject to market discipline. Sooner or later demographic expansion undercut land and labour productivity, and along with it, the agricultural surplus available for commercial and manufacturing growth in the broader social economy. Such had been the case with feudalism (Moore 2003b).*

*In contrast, capitalism achieved its long-run economic expansion by means of imposing bourgeois property relations on the countryside, compelling the transition from peasant producer to capitalist farmer. With the transition to capitalism, the imposition of private property in land, backed by the power of the modern state (and its imperial formations), propelled a process of dispossession and differentiation that enabled rising labour productivity in agriculture and a rising food surplus. Vast reservoirs of labour power took shape to feed the satanic mills, and vast agricultural surpluses were mobilized to feed these workers. From the Dutch and English agricultural revolutions of the early modern era, to the family farm and Green Revolutions of the nineteenth and twentieth centuries, the bloody expropriations of capital have justified themselves on the basis of this signal achievement (‘modernization’).*

*The road to the modern world, it seems, has been paved with cheap food. As noted earlier, food, energy and inputs are ‘cheap’ to the degree that they are produced, and otherwise mobilized, at significantly lower costs than the system wide average, and at significantly high volumes to drive down the costs of production for the system as a whole. The price of food is so pivotal because it conditions the price of labour.*

*The great eras of capitalist development have always been conditioned on massive demographic expansion and massive proletarianization. The signal contribution of agricultural revolutions to the course of capitalist development can be found here, in driving down the relative cost of food while driving forward proletarianization*

### 3 (Moore, Agricultural Revolutions in the Capitalist World-Ecology, 1450–2010, pg 395)

So the cheap food is referred to its capacity to condition the price of labour and so to lower production costs for the system as a whole: capitalist development has been based on the massive demographic expansion and driving forward proletarianization. In this sense, Moore clarifies the food-labour relationship as the core relationship of capitalistic development, since the price of food determines the value of commodified labour power and the capacity of capital to extract surplus value.

The hegemonic cycles of accumulation in Moore are based on agriculture (organizational) revolutions. Also in the British period, capitalist accumulation developed along 2 frontiers: a vertical one, moving *into* the Earth to extract coal, and an horizontal, moving *across* the Earth to produce wheat, especially in North America.

When another 'great depression' arrived in the 1870s, the era's rapid industrialization was possible on the basis of cheap food, delivered by the co-operative labours of both frontiers, at the same time as mass starvation in South Asia and China and genocide in North America.

Adapting the Arrighi's language (1994), Moore affirms that we are facing a *crisis* of an ecological regime when the conditions for an expansion of the ecological surplus start to erode and **food, energy and inputs become more, rather than less, expensive.**

Ecological regimes are ensuring the adequate flows of energy food, raw material and labour surpluses to the organizing centres of the worldwide system of accumulation through markets and institutions that are organizing at the same time the rest of nature: the decisive divide is town (consuming surplus) – countryside (producing surplus).

*All great waves of capital accumulation have unfolded through a greatly expanded ecological surplus, manifested in cheap food, cheap energy and cheap inputs. The creation of this ecological surplus is central to accumulation over the longue durée. There is a dialectic between capital's capacity to appropriate biophysical and social natures at low cost, and its immanent tendency to capitalize the reproduction of labour power and extra-human natures. Marx's theory of underproduction crisis – he calls it a 'general law' of accumulation – argues that 'the rate of profit is inversely proportional to the value of the raw materials' (1967 III, 111). [...] There is an important tension between the 'overproduction of machinery', and the 'underproduction' of raw materials (Marx 1967 III, 119). (Moore, the End of the Road, 2010, pg.393)*

It is possible to find a lot of similarities between the approach of Moore and David Harvey's chapter on accumulation by dispossession

*it is also possible to accumulate in the face of stagnant effective demand if the costs of inputs (land, raw materials, intermediate inputs, labour power) decline significantly. Access to cheaper inputs is, therefore, just as important as access to widening markets in keeping profitable opportunities open. [...] Wholly new mechanisms of accumulation by dispossession have also opened up. The emphasis upon intellectual property rights in the WTO negotiations (the so-called TRIPS agreement) points to ways in which the patenting accumulation by Dispossession and licensing of genetic material, seed plasma, and all manner of other products can now be used against whole populations whose practices had played a crucial role in the development of those materials [...] The result is the periodic creation of a stock of devalued, and in many instances undervalued, assets in some part of the world, which can be put to profitable use by the capital surpluses that lack opportunities elsewhere The analogy with the creation of an industrial reserve army by throwing people out of work is exact. Valuable assets are thrown out of circulation and devalued. They lie fallow and dormant until surplus capital seizes upon them to breath new life into capital accumulation (Harvey, the new imperialism,, pg 139-150)*

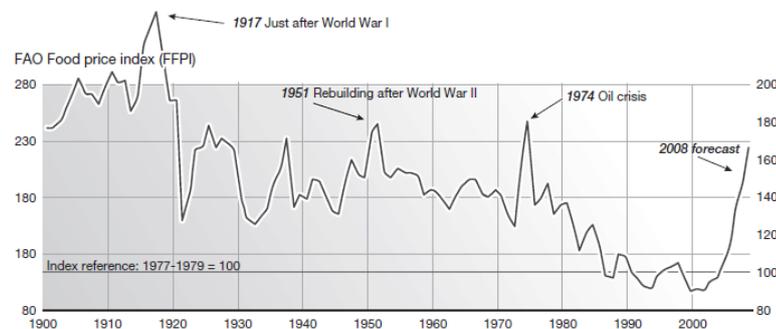
Moore raises the central question whether the present conjuncture represents *epochal* crisis of capitalism or a crisis of capitalism that can be resolved by reestablishing new conditions for accumulation.

If ecological surplus characterized every phase of capitalism, where today can such surpluses be found and produced? Is the neoliberal world order bringing the world system towards an 'agricultural revolution in reverse' (Braudel, 1972, pg 427), witnessing a constant decline in labour productivity and the relative food surplus?

Moore analyzes neoliberalism (which in Arrighi corresponds with the financialization phase of the US Hegemonic cycle of accumulation) in agriculture as characterized by the Uruguay Round and WTO, leading to the decoupling of world market prices from production costs (McMichael 2005, 282). This had 2 major consequences:

a) According to FAO data on food prices in the XX century, *world food prices dropped by 39 per cent between 1975 and 1989, and still further in the decade that followed* (ibid., 278; see also FAO 2009)

Figure 1 Cheap food and the neoliberal ecological regime



Source: FAO (2009).

b) major new opportunities for the concentration and centralization of capital in the agro-food sector

The analysis of Moore on neoliberalism as an historical phase of capitalist development identifies *two differentia specifica*:

a) Neoliberalism it has not generated the conditions for renewed economic growth and a broadly defined social development: no 'third technological revolution' occurred in order to release a productivity revolution reducing costs and free up income for a new expansion'. Moore assumes agriculture as an evident example *where nearly three decades of experimentation with genetically modified organisms has succeeded in transferring wealth and power from farmers to big capital without any success in raising intrinsic yields* (Moore, *the End of the Road*, 2010, pg.390).

b) penetration of finance into everyday life, with an increasing dependence of from the financial sector

*The transition from 'old' to 'new' agrarian questions during the 1970s, suggested for very different reasons by Bernstein (2001) and McMichael (1997), points to the exhaustion of capitalism's agro-ecological frontiers, set in motion during the long sixteenth century. While there are still forests and tracts of 'underutilized' land to enclose and exploit, today's frontiers are but drops in the bucket relative to the demands of value accumulation. Frontiers are not merely places 'out there' (and out of time) but are constituted by the varying logics of systemic reproduction in its successive developmental phases. This closure of the 'Great Frontier' (Webb 1964) marks an epochal transition*

*in the history of capitalism. The closure of resource, labour and waste frontiers has cut off a key avenue of capital's escape from the rising costs of production.*

*The rising capitalization of world agriculture – through which the farm becomes the agro-ecological pivot of 'downstream' and 'upstream' commodification – not only amplifies the tendency towards a declining rate of profit, but in equal measure amplifies the pressures to escape it, through efforts to extend the frontier of 'technical control' (Edwards 1979). [Moore, *The end of the Road*, 2010)*

Moore enlarges the approach of Arrighi introducing the great frontier concept as a premise to the appropriation of natural resources and a deeper understanding of the metabolic rift. The crucial theoretical passage it is the introduction of the Marxian dialectic between underproduction (too few inputs) and overproduction (too many commodities), describing the actual crisis as the reemergence of an underproduction crises, characterized by the insufficient flow of cheap food, fuel, labor, and energy to the productive circuit of capital (M-C-M+).

The neoliberal crisis has to do with the incapacity to produce the relative ecological surplus which previous cycles of accumulation produced by agriculture revolution which generated a great leap in the yields (with a small capital investment) and not a simple increase based on better allocation of resources.

According to Moore, Neoliberalism puts its hope to start a new era of cheap food in the biotechnology revolution and in the wave of new "enclosures": even if this would support the redistribution of income, deepening the class differentiation process among farmers and the proletarianization process, at the same time it has not deliver any real leap in the yields, enough to create a new expansion of production within a new systemic cycle of accumulation.

In reality, the aim of globalization of agricultural biotechnology was not to increase the yields but to stop the progressive decline in yield growth worldwide, but also in this case it was clear that it failed (f.i RoundupReady® crops) as 'superweeds' have evolved to survive the herbicide (Benbrook 2012), witnessing the quicker evolution of biopsycal nature than what capital can control.

So, according to Moore, the new GMO varieties are the core of a new yeld revolution but are not delivering the expected leap in food production with a little investment of capital. Gurian-Sherman (2009) in the Evaluation of the Performance of Genetically Engineered Crops published by Union of Concerned Scientists, concludes that *most yield gains are attributable to non-genetic engineering approaches [...]GE technology has produced neither intrinsic nor operational yield gains in commercialized varieties*

Moore considers the superweed effect as a central aspect in the failure of biotechnologies to generate a new agriculture revolution and a new cycle of accumulation based on commercial expansion:

*This 'superweed effect' marks one aspect of agriculture's differentia specifica in Marx's important – if too often neglected – argument, noted earlier, that the 'overproduction' of machinery (fixed capital) tends towards the 'underproduction' of raw materials (circulating capital). Rising costs of energy and inputs used in a given production cycle reinforce the tendency towards a declining rate of profit inscribed in rising mechanization. As capital invested in machinery overtakes that spent on wages, therefore, the very productivity gains achieved by mechanization and standardization set in motion widening demands for circulating capital (inputs). But the production of energy, wood, metals, fibres and other inputs is rooted in socioecological processes that do not respond quickly or easily to market signals. [Moore, *End of the Road?* 400]*

So Moore uses the Theory of Value to define the overproduction of machinery as other side of the coin of the underproduction of raw materials, and in agriculture the major efforts to increase labour productivity are leading to in the neoliberal era, to new strategies that seek to discipline biophysical nature at a cellular and even genetic level.

This passage is crucial to understand the actual phase of financialization of agriculture which will be analyzed in the next chapter, characterized by New Breeding Techniques, Hidden GMOs and dematerialization process.

The assumption of the analysis of Moore is that capital prefers to appropriate nature, but in the neoliberal (actual financial) phase, the opportunities to appropriate nature are reducing and the superweed effect is the exemplar case which in not allowing biotechnologies to keep the yields of the Green Revolution. The condition for generating a new cycle of accumulation would be to extend the area for commodity production and exchange, including in the capitalistic cycle nature not yet subsumed by capital.

The closure of the Great Frontier (Webb 1964) is just leaving a small margin for a better allocation of under-utilized resources which are not able to restart the capital accumulation process avoiding the rising costs of production. Moore does not agree with the vision of Neil Smith who sees GMOs creating the conditions for a new phase of accumulation characterized by '*capitalization all the way down*' to the genetic relations of life itself:

*Rather, partly in response to these increasing constraints, a new frontier in the production of nature has rapidly opened up, namely a vertical integration of nature into capital. This involves not just the production of nature 'all the way down', but its simultaneous financialization 'all the way up'. Capital is no longer content simply to plunder an available nature but rather increasingly moves to produce an inherently social nature as the basis of new sectors of production and accumulation. [Neil Smith 33]*

Indeed Moore underlines how the previous socio-technical innovations stimulating agricultural revolutions were based on variable forms of bourgeois territorial and property relations, technical dynamism *and* the availability of un- or undercapitalized nature.

After the end of Bretton Woods, during the neoliberal financial expansion, there was an increase of property claims on the genetic diversity of the biosphere: and even if Moore suspends its judgement whether biotech revolution could provide a way forward, he notices how the financialization of the neoliberal era signs the transition from formal to real subsumption of nature to capital.

In Moore, the cycle of accumulation absorbs nature (human and extrahuman) entirely free from the law of value.

The contradiction in historical capitalism has been to preserve and create -simultaneously to undermine and appropriate - the ecologies reproducing in autonomy from the circuit of capital: *rising capitalization of nature creates a world-historical situation of rising production costs stemming from the degradation of the conditions of production*. So, rising socio-ecological exhaustion and rising capitalization are two sides of the same coin.

The Green Revolution in Moore is characterized by an incredible expansion of relative ecological surplus constituting a new phase in the capitalization of global nature: both extra-human nature (cheap grains or energy) and human nature (relative surplus population: expanding the reserve army of labour through mechanization, labour-intensification and the class differentiation of peasantries) created the conditions for the lowest food market prices in world history.

So, on one side, capitalism has been realizing a massive expansion of the relative ecological surplus (cheap food, energy, materials) through an imperialistic policy for appropriating new resources. On the other hand, there is the strategy to intensify the capitalization of small zones of undercapitalized nature and the effort to fragment global nature.

The Green Revolution experienced different problems: on one side, in the Green Revolution period it was registered a trend toward farm concentration and energy 'inefficiency, with the rise in energy price, on the other hand the capacity to govern biophysical natures was eroded, both escalating resource depletion in water and soil, and the superweed effect.

So in the age of Green Revolution, the two contradictions within agriculture come into play, gradually eroding the mechanisms for delivering (or even sustaining) an ecological surplus sufficient for expanded accumulation.

The opportunity *and* obstacle of political ecology of Nature as capital comes to circulate through (and not merely around) biophysical circuits, so the faster these ecological revolutions are, they are moving from liberating to imprisoning accumulation. So Moore can conclude that, as the capitalization of global nature proceeds, the relative ecological surplus falls.

In this context, agriculture has a central role since the conditions for a commercial expansion and for the economic system to generate profits in the real economy and accumulate capital depends from the availability of food at cheap price, which will keep low the level of wages.

So the cycles of capital accumulation historically were linked to agriculture revolutions, allowing the interpretation of capitalism as a world ecology.

*In this context, the rise of significant peasant and farmer movements in many countries in the late twentieth century is an indication of the incompleteness of the transition to capitalism in agriculture. Concretely, the impetus for organizing movements that eventually formed cross-border ties came from the remaining areas of peasant and small-farm agriculture, which large-scale industrial farming had failed or not tried to subordinate or obliterate. Some scholars in recent years, pointing to the outsized role of finance capital, have argued that land ownership has become increasingly irrelevant under late capitalism. We argue instead that looming energy and food crises (with the attendant demand for biofuels and staple crops), new mechanisms for investing in carbon "sinks" to mitigate climate change, and the insecurity and volatility in financial markets have contributed to renewing capitalists' interest in land as a potentially lucrative investment and as a hedge against risk. (Edelmann Borrás page 3)*

The *incomplete transition to capitalism in agriculture* is what concerns the process of financialization of agriculture as Moore assumes with the "great frontier" closure.

In the context of the closure of the "great frontier" (Moore), it is important to keep a clear distinction between the commodification process (related to commercial expansion phase of the capitalistic cycles of accumulation), and the financialization phase: the commodification is still oriented to generate profits through the production process.

At the same time, the commodification of natural resources, and of agriculture production model in general, it is preparing the production system for a subsequent financialization phase, which is orienting the real production towards the logics of financial profits.

*Harriet Friedmann (1980, 158) defined commoditisation as the 'penetration into reproduction of commodity relations'. Accordingly, 'commoditisation is a process of deepening commodity relations within the cycle of reproduction. Commoditisation occurs to the extent that each household ... comes to depend increasingly on commodity relations for reproduction'. (Van Der Ploeg, 2010, pg 1)*

Following Moore, it is hard to distinguish other relevant financialization processes as the carbon credits or carbon finance<sup>1</sup>, which indirectly taken in consideration if not through the model of

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<sup>1</sup> [www.ifc.org](http://www.ifc.org)

production (Climate Smart Agriculture vs Agroecology) even if there are incorporated in many of the most relevant analysis through a biosphere approach (Vernadsky):

*Neoliberalism also involved increasing commodification and privatization of the biosphere, including appropriations of crop germplasm via breeders' rights and patents, which made it possible to generate huge profits from seeds that peasant farmers had selectively bred over thousands of years. Seed certification laws in almost every country increasingly dictated what seeds agriculturalists could plant and both reflected and contributed to a rapid and extreme concentration process among major seed companies (Howard 2009).*

*Another type of biosphere commodification involved new markets that treated forests and tree plantations as "sinks" for CO<sub>2</sub> and that generated "carbon credits" for their owners. (pg 30 Borras Edelman)*

Moore indicated the genetic resources axe as the central one for the innovation in agriculture, and in determining the model of production (Agroecology vs Climate Smart Agriculture) and the use of land (and fertility of soil).

In this framework, Agro-extractivism which has been individuated as a central (mostly export-oriented) extractivist strategy in BRICS and other countries, sometimes justified as an intensification of natural resources extraction lowering costs and time of extraction for national-state building, most of the times is part of the neoliberal process of commodification of agriculture and capitalization of nature in order to make profitables the residual spaces of the great frontier.

So, in the WST prespective, agro-extractivism would be just one of the many pathways of capital flows trying to confront the fall of profitability of capital investments, since agro-extractivist policies are not constituting an agriculture revolution, but are still working for increasing production and commercial expansion.

In this sense, China has a major role in securing the demand of raw materials worldwide, but still this is not allowing an agricultural revolution comparable with the Green Revolution and the one expected from Biotech

#### **4 China in the Hegemonic change**

The role played by business organizations is crucial in the analysis of Arrighi: every material expansion of the capitalist world-economy was based on a specific organizational structure, progressively undermined by the expansion itself, since the economic space for high returns reduced as the expansion was growing, and overcome by a new organizational innovation.

In Moore, we have seen how the key organizational innovation is the agricultural one.

At the same time only the emergence of a new social bloc generating a change of hegemony and a new material expansion, reestablishing a trickle-down effect of the economic growth, will put under control the social conflict.

In this sense, financialization is a crucial moment for Anti-systemic Movements and their social struggles to redefine a new equilibrium of powers. Still a mayor question in World System Theory approach is how the social struggles at local and global level can influence the Worldwide system of Capital Accumulation.

In the actual phase, despite the crisis and squeezing of the functions of the nation-state, Arrighi clearly individuates the East Asia region, and China in particular, as a possible state-region area leading the hegemonic passage.

Indeed, China has been indicated by Jason Moore (2010) as the international power leading to a new commercial expansion based on an increase agriculture productivity, providing cheap food to support the capitalistic accumulation in a framework of exhaustion of agro-ecological frontiers of capitalistic model of production.

Indeed, China has been indicated by Moore as the main actor leading to a new commercial expansion based on agriculture productivity

*Worldwide, agricultural labor productivity ticked upwards slowly after 1990, rising to just 1.36% through 2005, over the 1.12% average of 1961-90 (Alston, Babcock & Pardey, 2010: 461). The modest increase was largely attributable to Chinese agricultural reform, which has yet to provide a kind of hegemonic model for the world-system along the lines of the Dutch, British, and American agricultures in their golden ages. Indeed, for all the remarkable accomplishments of the Chinese "miracle," labor productivity in industry and agriculture both remain one-quarter (or less) the average obtaining within the Global North (Jefferson, Hub & Su, 2006; Jin, Huang & Rozelle, 2010). There are few signs that China's ascent, however successful on its own terms, offers the kind of hegemonic model for industry and agriculture that might be emulated by our era's rising powers. [...] China does not appear poised to launch an agricultural revolution of the sort we have known in the history of capitalism—one that not only feeds the ascendant power, but leads the system to a new expansion (Moore, *Bad money and Cheap Food*, 244-252)*

As we have discussed in the previous chapter, this expansion, also based on new extractivism, is not sufficient to shift the system to a new productive expansion since the increase the yields is not sufficient to generate an agriculture revolution.

More in general, there is a discussion on *globalization 'with Chinese characteristics* which allows to speak of a broader hegemony change, in which China is following the Roosevelt's project of multilateralism and a different economic colonialism (whose characteristics are still under discussion, including the use of plurilateral regional orders and plurilateral embedded orders).

This general trend of Chinese leadership can be identified in many different signals that after the election of Trump as President of USA, supporting national protectionism, have been intensified as the Chinese white paper on the right to development, the inclusion of Renminbi in IFM Foreign Exchange Reserves, the claim for recognition of Palestine as a State, the Belt and Road Initiative.

Reading the Chinese leadership in the Arrighi-Moore framework, we can identify the role of China in the New Breeding Techniques and in the Genome editing and sequencing skills that are cheaper than in other countries

## **5 High Capacity in Developing and Applying Agricultural Biotechnologies in Crops Genome Editing and Sequencing in China**

China is among the few countries in the world to have capacity for applying genome editing in different sectors. China is considering genome editing as a strategic tool, that can be applied in precision medicine. China developed huge capacity in genome mapping and sequencing.

With huge capacity and decrease in costs of sequencing and analyzing China went on to add more capacity in public and private sector. The thrust on precision medicine has given a boost to genome sequencing efforts in China. With respect to genome editing Chinese scientists have been in the forefront of experimentation including a controversial one.

In 2016 China announced an ambitious 15 year precision medicine initiative. Studying one million human genome in this initiative provides ample scope for genome sequencing companies and institutes to get grants and work on sequencing and analysis and to enable development of novel

therapies. To fulfill its increasing appetite for capacity China is embarking upon many plans including establishing centres elsewhere in the world in a collaborative mode, acquiring companies in genomics, and, of late it has started building its own sequencing systems which is expected to drive the costs further down. This multi-prong strategy is likely to enable China develop capacity in all aspects, ranging from building systems to developing drugs by applying precision medicine.

[https://www.nature.com/polopoly\\_fs/1.20121!/menu/main/topColumns/topLeftColumn/pdf/534462a.pdf](https://www.nature.com/polopoly_fs/1.20121!/menu/main/topColumns/topLeftColumn/pdf/534462a.pdf)

<https://www.wired.com/2017/05/chinese-genome-giant-sets-sights-ultimate-sequencer/>

*China is exploring microalgae also through high technology. According to a news report a genome editing platform for industrial microalgae is being established.* [http://english.cas.cn/newsroom/research\\_news/201609/t20160905\\_167406.shtml](http://english.cas.cn/newsroom/research_news/201609/t20160905_167406.shtml)

*In case of fisheries, genome editing in Zebra Fish being attempted by Chinese scientists.*

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4978904/>

*The acquisition of Syngenta by a Chinese company is expected to help China to access the patents and technologies owned by Syngenta and thereby increase its arsenal in crop biotechnology. This may result in China leading in Asia in genome edited crops too.*

*In fact China's technological prowess is so important that few have called for collaboration between USA and China in genome technology and Artificial Intelligence and have suggested dialogs than conformation as preferred solution.*

[https://www.wilsoncenter.org/sites/default/files/who\\_will\\_own\\_the\\_secrets\\_in\\_our\\_genes.pdf](https://www.wilsoncenter.org/sites/default/files/who_will_own_the_secrets_in_our_genes.pdf)

In this sense, China can be considered the leading country on New Breeding Techniques and biotechnologies, which can further develop an agriculture revolution or a broader appropriation of world genetic resources with the patenting of primitive traits.

## 6 Conclusions

World System Theory approach of Arrighi-Moore can offer an important lens to read the role of agro – extractivist policies in the cycles of capitalistic accumulation, distinguishing how the low cost extraction raw material can affect the capital accumulation and the actual financialization phase of the economy and agriculture.

At the same time the WST framework can highlight the different roles of the BRICS and China in particular, in the hegemonic change of capital accumulation.

In particular, the central role of agricultural innovations and revolutions in the Arrighi-Moore WST, opens up further readings on the actual role of China in the hegemonic cycles of capital accumulation, extending the agro-extractivism policies to genetic resources and biodiversity and bridging the analysis to the worldwide economic system.

## **New Extractivism, Peasantries and Social Dynamics: Critical Perspectives and Debates**

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