“Extreme Infrastructure”

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an organisation that aims to make energy production and consumption
fair, democratic, healthy and sustainable.

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It is undoubtedly true that the fossil fuel industry now employs increasingly extreme methods – both technologically and in terms of human and environmental oppression – to secure the oil, coal and gas needed to keep the wheels of capital accumulation rolling: hence the term “extreme energy”. But such “extreme production” is not unique to the energy sector: mining companies too are increasingly forced to open up remote and ecologically intransigent areas to extract the minerals they need, in turn necessitating new forms of “extreme technology” and “extreme finance” to wrestle minerals from the ground. Manufacturers are no less trapped: to exploit cheap labour, they must move production to sites that are more and more distant from points of consumption, requiring “extreme infrastructure” to speed up the process of exchange, and hence profit-taking.

None of this is taking place without resistance – both from humans and from nature. While extreme forms of production signal the direction of travel that globalised forms of capital require if they are to expand, the ultimate trajectory will not be written in the masterplans that oil industry or mining executives draw up or by the deliberations of intergovernmental meetings, nor, indeed, inscribed within some presumed, steam-roller logic behind global capitalism, whose coherence is never as coherent as theorists project. It will be determined by the ways in which those plans interact with other agents, human and non-human, both now and in the future. A better understanding of the systemic forces and ad hoc political alliances that are driving “extreme production may therefore assist activists fighting “extreme extraction” in all in various forms, not least by identifying potential linkages to other struggles and by revealing some of the undoubted vulnerabilities that extreme extraction itself creates for capital.

Infrastructure Corridors

One area that is perhaps worth exploring is the current push by capital for “infrastructure corridors”, not least because it is where various strands of “extreme production” – from oil and gas companies to mining and agribusiness conglomerates and off-shoring manufacturers – are coalescing to make common cause. No (inhabited) continent is excluded. From Africa to Asia and the Arctic to South America, infrastructure masterplans have been drawn to reconfigure whole land masses (and the seas connecting them) into ‘production and distribution hubs’, ‘transit zones’, ‘development corridors’, ‘export zones’, ‘spatial development initiatives’, ‘interconnectors’ and ‘intermodal logistics terminals’. Some of the plans are national in scale, others regional and still others continent-wide or near-global.

In Africa, over 30 corridors have been initiated, principally to enable the extraction of agricultural produce and minerals. The majority are ‘anchored’ around mining projects but many have ancillary agricultural corridors or tourism developments as secondary offshoots. In southern Africa, a race is on to develop the shortest corridor routes to the sea from Zambia’s copperbelt province and the Democratic Republic of the Congo’s mineral-rich Katanga province. Corridors serving iron ore, copper, coal, nickel and other mines are also planned in northern and central Mozambique, Botswana, Ghana, Liberia and Sierra Leone.

No less ambitious plans are on the drawing board for South America. Under current proposals, some 579 projects, costing an estimated $163 billion, have been identified, of which 89 per cent involve

roads, airports, ports, inland waterways and 'multimodal' transport schemes, 9 per cent energy projects and the rest communications infrastructure. Of these, 107 have been completed and 169 are under construction: the rest are still at the planning stage.

All the countries of Asia have similar plans. In Indonesia, six corridors are being promoted under an ambitious 15-year, $1 trillion Masterplan for Acceleration and Expansion of Indonesia's Economic Development. Over 1,000 infrastructure and logistics projects are planned, including roads, railways (particularly to haul coal), airports and ports. Each of the six interconnecting corridors is centred on developing key industries or natural resources (notably coal and palm oil) through clustered manufacturing hubs and Special Economic Zones (SEZ). Plans are also afoot for marine corridors to connect the islands of the Indonesian archipelago. Militarisation of these proposed sea routes and the exclusion of local fisherfolk is anticipated.

But the Big Daddy of attempted time-space annihilation (and, some would argue, of contemporary struggles for regional hegemony) is China's 'One Belt, One Road' (OBOR) programme, officially launched in 2013. Encompassing 60 countries (thus potentially half of the world), OBOR is intended to create a network of free trade areas connected by both terrestrial and marine corridors stretching from the Pacific to the Baltic Sea. Its 'belt' (officially the 'New Silk Road Economic Belt') consists of four land corridors that would collectively connect China to Central Asia, Russia, Europe, the Persian Gulf, Southeast Asia, South Asia and the Indian Ocean. The 'road' is in fact a marine corridor (the '21st-Century Maritime Silk Road') designed to go from China's coast to Europe via both the Indian Ocean and the South Pacific. The corridor would involve not only shipping but, reportedly, deep seabed mining in the Indian Ocean.

Eliminating Space and Time

Multiple social, ecological and political dynamics lie behind this push for corridors; but one bundle of influential drivers stands out. They stem from a problem that some people in finance now term the 'production-consumption disconnect'. This disconnect arises in part from economies of scale that have enabled more remote deposits of raw materials for industrial production to be extracted; in part from the increasing distances between those deposits and the industrial sites where the extracted resources are transformed into consumer goods; and in part from the distances between those production sites and the places where the 'global consuming class' live.

The problem is not new. Almost 150 years ago, Karl Marx revealed how the more that capital expands, the more it needs to improve infrastructure to 'annihilate space by time'. That reality remains a core challenge for contemporary infrastructure planning within would-be global politburos, such as the World Bank. Marx may not get a mention in the Bank's flagship 2009 World Development Report *Reshaping Economic Geography* (its takeaway policy summary: 'No country has grown to riches without changing the geographic distribution of its people and production for market access'); but 'annihilating space by time' is *the* leitmotif that runs through the report's 380 pages.

Distance is a key theme, defined by the Bank not in Euclidean terms but as a measure of time and money – and, more specifically, 'the ease or difficulty for goods, services, labour, capital, information, and ideas to traverse space'. Distance matters because time matters. And time matters because the faster commodities can be produced and exchanged, the greater the profits for individual capitalists and the sharper their competitive edge over rivals.

To overcome diseconomies of space, bigger, more powerful and more efficient ships, trucks, trains, barges and cargo planes must be built. These in turn necessitate "extreme infrastructure" in the form of expanded or upgraded railway systems and ports, wider roads bigger bridges, deeper canals, straighter rivers and longer airport runways. The resulting economies of scale in transport stimulate further economies of scale in production (and vice versa), reducing the costs of raw materials and finished goods, stimulating demand and triggering yet another round of pressures to reduce costs by compressing time and distance. One wave of innovation thus creates pressures for yet further innovation.

As bigger and faster forms of transport are developed and the costs of moving goods fall relative to other costs, the geographies of raw material extraction and production are reconfigured. Companies have a wider choice of locations for a factory, increasingly able to move anywhere in the world in search of cheap labour, favourable tax regimes or weak regulatory environments. It becomes more possible for capital to fragment production processes to an unprecedented degree and to move production further and further afield to areas that promise greater profitability, even though these may be often thousands of miles from the major points of consumption.

Likewise, remoter sources of raw materials become commercially viable. Until the 1950s, for example, the high costs of transporting iron ore (typically 60 per cent of production costs) meant that steel mills needed to be sited close to the point of iron ore extraction. But by the 1960s, developments in shipping had made it competitive for the Japanese steel industry to transport huge volumes of iron ore from Australia over 5,000 miles away. By the 1980s, bulk carriers had been developed that were twice the size of anything previously available, enabling Japan to import iron ore from the newly-developed Carajas mine in the Brazilian Amazon over 12,000 miles away 'more cheaply than US Steel could ship its iron ore across the Great Lakes' (Bunker and Ciccantell 2005).

Today, the distances between points of production and points of consumption are often huge, involving multiple journeys and multiple forms of transport. A standard desktop computer, for example, typically involves the assemblage of some 4,000 components manufactured by as many as 250 different suppliers whose various factories are likely to be dotted around areas of cheap, skilled labour, notably Asia. Those components in turn rely on minerals being extracted from all over the globe. The coating for a standard monitor alone contains compounds manufactured from sulfur, zinc, silver, bauxite, gold and a host of other minerals whose names are unfamiliar to all but mineralogists – alunite, azurite, boronite, enargite, cerargyrite, realgar and tetrahedrite – all mined or processed in countries that are often thousands of kilometres from where the computer will be assembled, let alone finally be purchased and used.

To squeeze profits from such geographically dispersed sites of production, companies have increasingly adopted 'just-in-time' inventory systems, not least in order to cut down on the costs of traditional warehousing: trucks, trains and ships are effectively used instead as mobile warehouses. The slightest delay in transporting components can thus cause major financial losses. Similarly, the economies of scale that make mines such as Carajas in the Amazon commercially viable require 'huge deposits of high-quality ore to fill ships on a regular basis and with minimum delay in harbour' (Bunker and Ciccantell 2005). In the calculus of global manufacturing chains, 'every day in ocean travel that a country is distant from the importer reduces the probability of sourcing manufactured goods from that country by 1 per cent' (World Bank 2009).

Extreme Finance

The combined pressures of economies of scale, the off-shoring of manufacturing, the extraction of oil, gas and minerals from remoter and remoter areas, the growth of a 'global consuming class' and just-in-time delivery systems are now playing out in the push for corridors.

But extreme infrastructure is costly – necessitating "extreme finance". Many of the individual projects, and certainly the wider schemes as a totality, are simply beyond the resources that can be raised through historical forms of infrastructure finance.

Take the mining projects that are intended to act as anchor investments for many of the corridors in Africa. In the past, mining companies have generally funded the dedicated infrastructure that connects 'pit to port' off their own balance sheets, albeit often with guarantees from multilateral development banks and tax breaks and other subsidies from states. But this is no longer an option for most new mines. The routes are too long and the scale of the infrastructure too costly, particularly for small- to medium-sized mines, for a single operator to finance by themselves. A study by the World Bank's International Finance Corporation found just one mining project that was 'bankable' as a purely privately financed project (di Borgo 2012). The costs are also beyond the wherewithal of many

national governments and private banks, even when acting in consort. Although some projects could be financed by bringing in multilateral sources of finance, such as the World Bank, such sources could not conceivably finance all the projects that capital needs for its 'annihilate space by time' demands. Oil and gas companies face a similar challenge with "extreme energy" projects.

Globally, there is now a massive gap between the available funding for new infrastructure and the amounts said to be needed. Some estimate that $50–70 trillion will need to be raised between now and 2030, of which about 37 per cent would be for infrastructure in emerging countries. This would mean finding $0.5 trillion to $1.5 trillion every year over and above what is currently being spent – and that is just for road, rail, port, airport, water and telecom development: schools, hospitals and other social infrastructure would be extra. The shortfall in the transport sector alone is an estimated $260 billion every year between now and 2030. The shortfalls in the energy sector are even higher – some $530 billion a year (OECD 2015c). A study for the 2015 meeting of the leaders of the G20 was blunt: 'Traditional funding sources will not be sufficient to meet these financing gaps' (World Bank *et al*. 2015).

As in the past, capital has few options but to attempt to expand the pool of finance on which it can draw. The joint stock company, for example, arose in part to raise the huge sums needed to finance the infrastructure capital needed in the 1860s (as Marx remarked, 'Without joint stock, the world would still be without railways' – it would simply have taken too long for any owner-capitalist acting alone to accumulate capital sufficient for their construction). Likewise, multilateral development banks and syndicated bank loans emerged to finance post-colonial infrastructure development in the global South.

Today, capital must similarly move to tap new sources of finance, in this instance wider capital markets, if it is not to implode. Hence the new alliances that oil and gas companies, mining companies and others are building with new financial actors – notably private equity funds. Hence the re-engineering of infrastructure finance to make it more attractive to private investors by governments providing guaranteed income streams, compensation against new legislation that might affect profits and the like. And hence the push for Public-Private Partnerships (which are central to every one of the proposed corridors and, indeed, increasingly important to the financing of individual "extreme energy" projects) to provide both an enticement to private investors and the foundation stone on which other extractive forms of finance can be built.

A failure to entice the sums required from investors thus creates a major vulnerability for capital's corridor programme: and, as such, it has turned the financing of "extreme infrastructure" into a potent emerging arena of struggle. This may offer scope for new alliances among those challenging corridors, "extreme energy" projects and other forms of "extreme extractivism". For those whose livelihoods are organised not around just-in-time delivery systems but around the collective right of all to survive, the linkages surely merit further exploration.

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