

## Increasing Economic Activities in the Polar Seas and its Global Implications

Dr Suprita Suman,

Department of Political Science, Patna Women's College Patna University, Patna

### *Abstract*

*The global warming has increased the accessibility of the polar regions. Both the North and South Poles comprise the oceanic part which is now opened up for the commercial activities. These two poles are contrast geographically. The North Pole is the Ocean ringed by the land where as the South Pole is the landmass surrounded by the Antarctica Ocean. Both these Poles represent a fragile marine environment. The melting of Arctic and the Antarctica unleashed opportunities of the blue economy. The Arctic is surrounded by the powerful sovereign countries but the Antarctica is an unmanned territory and has been declared as the demilitarized through the Antarctica Treaty of 1959. Noe it is reserved for the research purpose. But its pristine beauty has attracted the tourists all around the world and now the coastal region as been is visited by both the tourists and fish catchers. There is also signalled that some countries are interested in the resource exploration in the coastal areas of the Antarctica also. All these commercial activities have challenged the both the Arctic and the Antarctica Ocean. Due to low temperature these are susceptible to the incidence of the oil spill. Apart from the environmental degradation the marine resources of these two oceans are also facing threat of being depleted.*

*Key Words: polar melt, the Arctic Ocean, the Antarctica Ocean, blue economy.*

Global warming has severely impacted the temperature of the Polar regions and especially the oceanic part. The ice packs over the Arctic Ocean and the Antarctica a Oceans are melting; now it is being predicted by the experts that it would be ice-free in the coming few years. Due to an increase in temperature the multiyear sea ice<sup>6</sup> has declined. NASA researchers have found, “the thicker multiyear ice which survived several summer melt seasons, is being rapidly replaced by thinner, more ephemeral one-year ice formed over a single winter (the young-age ice is soft and melts faster

compared to the multiyear ice). Increasing ice melting means that it is exposed for absorbing sunlight, raising temperature of the water, making the floating ice to melt. The heat of sunlight is more readily absorbed when falling on water than on ice (ice has a higher ‘albedo’<sup>7</sup> than water), causing further warming and further melting of ice in turn.” The surface of ice is thinning and now there is shrinkage in the ice pack areas due to melting of ice (Quillérou et al 2017, 2). Thus the perennially ice-covered Arctic Ocean has now started being to a seasonally ice-free sea (Berkman and Young: 2009). The US National Snow and Ice Data Centre in Boulder Colorado, 03 March 2015 reported, “the Arctic sea ice is now shrinking and thinning because of rising concentrations of anthropogenic greenhouse gases in the atmosphere, leaving longer sea ice-free seasons.” These changes in the Arctic environment open up the Arctic ocean-floor for resource exploration and extraction, waters for navigation and fisheries. These new opportunities for economic development in the region which could impact global trade patterns and trends (Quillérou et al 2017) has drawn global interests in Arctic energy, fishing, shipping, and tourism because the ice-free Arctic would be viable for navigation, mining and other economic activities like drilling, mining, fishing, etc. The Antarctica has been facing a different situation as the Antarctica landmass is an unmanned territory and the blue economy has burgeoning around it and the exclusive economic zone has been exploited by few dominated nations and competition for fishing.

The term Blue Economy includes the oil exploration, aqua culture, shipping and other activities or in another way as a sub sector of an economy, the blue economy or coastal economy includes all economic activities including the sum of output, employment and wages, taking place on or near the coast. This involves the small fishermen to business tycoon operating with huge ships and contributing to food security to energy security. The blue economy with its diverse produces has unleashed numerous opportunities leading to employment and income. The concept of “Oceans Economy” or “Blue Economy” is recent and originated from the United Nations Conference on Sustainable Development held in Rio de Janeiro in 2012.<sup>4</sup> At the heart of the concept is a separation

of socio-economic development from environmental degradation, which is how it has traditionally been seen as a global status quo (Godfrey,2016,2).

According to the United Nations Environment Programme states, “oceans are indeed correctly compared to a cornucopia for humanity, by providing us with food, oxygen and livelihoods”. The basic element of the blue economy is the oceans. The oceans provide connectivity, resources, and sustenance to climate and weather. The oceans facilitated global trades and adding nutrition to a major section. When the world witnessed all these stories the two Oceans of the world the Arctic and the Antarctica or the Southern Ocean which are the Polar Regions of the earth were remained relatively isolated because of their ice conditions.

Presence of thick was a protective shield for the Arctic and the Antarctica Ocean. With the climate change these regions are witnessing decline in the presence of ice or the ice sheets are being softer which made the commercial activities possible. Thus, both Arctic and the Antarctica are being eyed as a basket of opportunities in the blue economy sector. Both the Oceans are blessed with the pristine beauty, amazing marine biodiversity and thus capable of attracting the tourists giving boost to Polar Cruise.

The Antarctic Ocean —or Southern Ocean— is located at the Southern end of the Southern hemisphere and it stretches over approximately 22 million km<sup>2</sup> and 17.968 km of coastline. The Antarctic Ocean connects the Pacific, Atlantic and Indian Ocean basins, and it influences the climate of the entire globe through the Antarctic circumpolar current, the largest ocean current, which distributes heat and influences global rain patterns and temperatures. Antarctic coasts are the habitats to great animal and plant biodiversity due to its milder climate. The South Pole or Antarctica is inhabited landmass surrounded by the Southern Sea or Antarctica. The global warming has increased the activities in the Southern Ocean and as the Antarctica is demilitarised by the Antarctica Treaty and has been reserved for the research only therefore, except tourism there is no evidence of other types of commercial activities.

The Arctic is the North Pole of the Earth; “limited by the Arctic Circle located at 66° 33' North Latitude” (AMSA, 2009), the region includes the edges of Eurasia and the North American continent. This region includes eight nations and the Arctic Ocean. This

includes islands, archipelago and the bordering parts of the Atlantic and the Pacific Ocean, its huge landmass covers six per cent surface of the Earth and spreads over 21 million square kilometres. Due to thick ice and inhospitable climate, this region has very low population density. The Arctic Ocean is ringed by five sovereign nations called the Arctic Five (A5) are Russia, Canada, the US, Norway and Denmark (due to Greenland). These countries have continental shelves in its basin. This makes it relatively isolated from rest of the oceans of the world. The Fram Straits which runs between Greenland and Norway connects it with the other oceans of the world. The three other countries in this region are Sweden, Finland and Iceland; all are together these are called Arctic Eight (A-8). The Arctic covers land area – approximately 14 million square kilometres which includes the northern Part of three Canadian territories, Northern part of Russia, Alaska province of the US, Norway and Greenland (a territory of Denmark), Sweden, Iceland and Finland. The Arctic Ocean including its seas is the smallest and shallowest among all the ocean on earth forms the major part of the Arctic region. The Arctic geography defines this region as “the Greenland Sea, the Barents Sea, the Kara Sea, the Laptev Sea, the East Siberian Sea, the Chukchi Sea, the Beaufort Sea as well as Baffin Bay, the Foxe Basin, numerous straits and bays of the Canadian Arctic Archipelago, the northern parts of the Pacific and Atlantic oceans; the Canadian Arctic Archipelago, Greenland, Spitsbergen, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, Novosibirsk Islands and Wrangle Island, as well as the northern coasts of the continents of Eurasia and North America” (AMSA 2009 16-18). It is surrounded by the three continents Asia, Europe and, and the North American Continent twenty-four time zones in the northernmost part of the world<sup>1</sup>.” Its population of approximately four million includes dozens of indigenous peoples living in isolation from mainstream of the world. The thick ice pack over the Arctic Ocean was not suitable for commercial activities and navigation and thus remained in isolation from the global politics and commerce. Global warming has severely impacted the temperature of the Arctic region. The ice packs over the Arctic Oceans are melting; now it is being predicted by the experts that it would be ice-free in

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<sup>1</sup> <https://arctic.ru/geographics/>

the coming few years. Due to an increase in temperature the multiyear sea ice<sup>2</sup> has declined. NASA researchers have found, “the thicker multi-year ice which survived several summer melt seasons, is being rapidly replaced by thinner, more ephemeral one-year ice formed over a single winter (the young-age ice is soft and melts faster compared to the multiyear ice). Increasing ice melting means that it is exposed for absorbing sunlight, raising temperature of the water, making the floating ice to melt. The heat of sunlight is more readily absorbed when falling on water than on ice (ice has a higher ‘albedo’<sup>3</sup> than water), causing further warming and further melting of ice in turn.” The surface of ice is thinning and now there is shrinkage in the ice pack areas due to melting of ice (Quillérou et al 2017, 2). Thus the perennially ice-covered Arctic Ocean has now started being to a seasonally ice-free sea (Berkman and Young: 2009). The US National Snow and Ice Data Centre in Boulder Colorado, 03 March 2015 reported, “the Arctic sea ice is now shrinking and thinning because of rising concentrations of anthropogenic greenhouse gases in the atmosphere, leaving longer sea ice-free seasons.” These changes in the Arctic environment open up the Arctic ocean-floor for resource exploration and extraction, waters for navigation and fisheries. These new opportunities for economic development in the region which could impact global trade patterns and trends (Quillérou et al 2017) has drawn global interests in Arctic energy, fishing, shipping, and tourism because the ice-free Arctic would be viable for navigation, mining and other economic activities like drilling, mining, fishing, etc

### **Natural Resources in the Arctic and Antarctica Ocean**

The Arctic Ocean’s continental shelf are possibly content geographically largest unexplored prospective area for petroleum remaining on Earth (USGS 2008) about 22 per cent of petroleum and 15 % of total global oil resources . Apart from this the Arctic region is rich in diamond, gold, zinc, nickel and tungsten These minerals are growing in

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<sup>2</sup> Multiyear ice are old ice which has been surviving after facing at least one melt season; it is typically 2 to 4 m (6.6 to 13.1 feet) thick and becomes thicker as more ice grows on its underside. Such ice has distinct properties that distinguish it from first-year ice or new ice, based on the processes that occur during the summer melt. Multiyear sea ice contains much less brine and more air pockets than first-year ice. The Arctic, in contrast, is relatively land-locked, allowing extensive multiyear ice to form.

<sup>3</sup> Albedo is “the fraction of solar energy (shortwave radiation) reflected from the earth back into space. It is a measure of the reflectivity of the earth’s surface. Ice, especially with snow on top of it, has a high albedo: most sunlight hitting the surface bounces back towards space”.

importance as many of these are used in electronics and “green technology” (Virtanen 2013).

*(i)Fishing:* Arctic is rich in marine resources. The melting of polar ice caps has made fisheries commercially viable in the Arctic Ocean. The Arctic Ocean is connected to several significant breeding areas of fish stocks, which are expected to move north with the rising Arctic water temperatures. In fact, this change has been underway for the last 40 years. The Alaskan coast and Canada have vast stocks of valuable species of fish known as Pacific salmon demanded in the North America and Russia. The Atlantic cod, a popular variety of fish is found in the Barents Sea,. The Barents’s Sea has world’s largest cod stocks because the ecosystem of the Barents Sea is good for the cods where they are completely dependent on the availability of capelin and herring for their food. An another species is Pollock, a white fish belonging to the largest fish stocks in the Bering Sea between Alaska and Russia. Due to availability of oxygen the Arctic is good for breeding of high quality of the fishes (Larsen 1990). The Arctic water also contains halibut, redfish, haddock, king crab, snow crab and Pacific cod. Biological resources are similarly bountiful in the Far North – the king crab, snow crab and Pacific cod. Fishing in the Arctic region constitutes 10 per cent of the world fishing (Borgerson 2013).The salmon and trout farming in the Arctic Ocean account for approx 7.7 per cent of the world production (Czarny 2011). Both fishing and oil exploration and mining have added a new dimension to the Arctic region. Now the Arctic nations are putting every effort to grab maximum territories in the Arctic region.

The Antarctica Ocean is rich in krill and it has been estimated that the it is the home of 379,000,000 tonnes of krill. Over half of this krill is eaten each year by the wildlife of the region, such as whales, seals, penguins, squid, and fish. Though these krill are plentiful in the Southern Ocean, their catch has raised significant uncertainties about its population, and its relationship with the ecosystem as a whole. These include long-term trends regarding the amount of krill in the water, the spatial distribution of krill, how much krill is needed to sustain predator species, and the impact of climate change on krill populations. The population of the Antarctic krill is intimately tied to seasonal sea ice

conditions, climate, and ocean currents. The Western Antarctic Peninsula is the important region where the fishery operates. This area has experienced major warming over the last 50 years, and as a result, the extent and duration of winter sea ice are being reduced. This represents an important challenge in the management of the krill fishery.

The Antarctic krill fishery which was started in the early 1970s reached to peak in the late 1980s with catches up to 500,000 tonnes per year, by USSR and Japan. From the mid-1990s onwards, though dropped to under 100,000 MT per year. However, there has been a renewed interest in fishing for krill due to a growing market for nutritional supplements and fishmeal. In 2014, 290,000 tonnes of krill were harvested in the South Atlantic Sector. In 2014, approximately twelve vessels fished for Antarctic krill. Norway, Korea, China, and Chile are the biggest krill fishing nations (Antarctica Wild Life Research Fund).

### **Navigable Shipping Lanes**

The ice melting in the Arctic Ocean made the strategic shipping lanes navigable, have the potential to transform global shipping patterns. The Northeast Passage (NEP) and the Northwest Passage (NWP) together encircle the earth and can be seen in Map 2. The Northeast Passage (NEP) is a sea route which connects the Atlantic and the Pacific Oceans traversing the Arctic following Russia's and Norway's coasts. Northwest Passage—a sea route connecting the Atlantic and Pacific Oceans through the northern Canadian Archipelago. The Northwest Passage (NWP) is not a single marine route but combination of six to seven routes connecting the Davis Strait and the Baffin Bay in the east and the Beaufort Sea in the west. It is a transportation corridor channelled through islands occupying broad expanses of water and land in the north-south direction. The third is the Transpolar Passage (TPP) or Transpolar Sea Route (TSR) that is a future naval Arctic route that runs from the Pacific Ocean to the Atlantic Ocean through the Arctic Ocean. This runs through the high sea portion of the Arctic Ocean cover all waters that are solely international waters, no state has jurisdiction over it and therefore can be a



politically viable transport venue. The map of the Anticipated Arctic Transit Routes is shown in Map 3.

**Map 3 The Arctic Shipping Lanes**



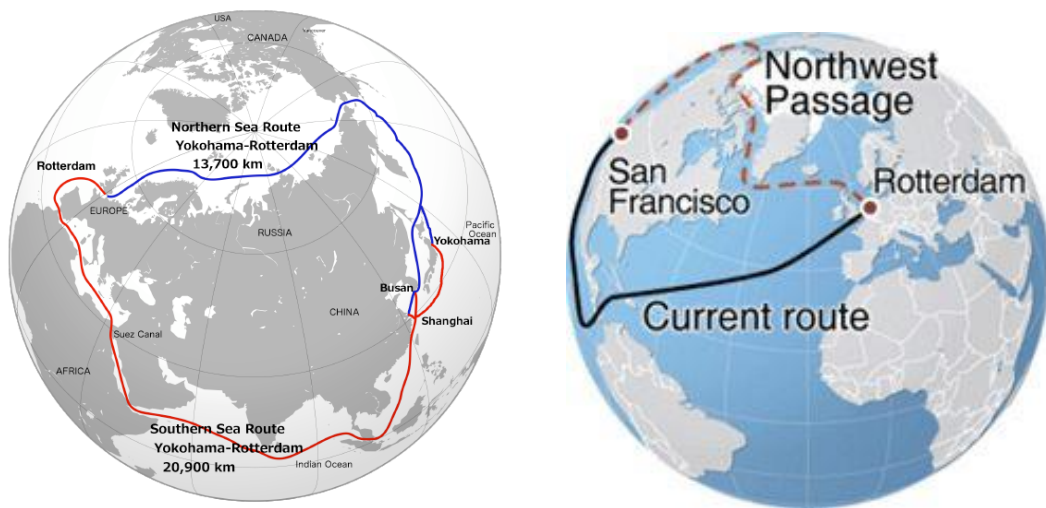
The European Community and the North Asian countries would be benefited if the Arctic routes become navigable.

(i) The Arctic routes are shorter than the existing routes which would save time and fuel. For example it would boost trade between north-west Europe and countries such as China, Japan and South Korea by making the voyage far shorter and thus cost effective. The NSR reduces shipping distances and time between North western Europe and Northeast Asia by about one third and average transport cost reductions of between 20%



and 30% between both regions using intensively the NSR (Bekkers at al 2015. 4). The trade from these routes may have serious implications over the country like Egypt in term of revenue earned by Suez Canal. The Map shows the comparative advantage of the NSR over the existing shipping southern shipping route. The red line represents the Southern Shipping Route through Suez Canal and the blue line represents the Northern Sea Route which is comparatively shorter.

#### Map 4 Shipping Shortcuts through NSR and NWP



Northwest Passage (NWP) is not single straight rather a combination of oceanic channels, gulfs and sounds considered as maritime highway that forms an Arctic route connecting the Atlantic and Pacific Oceans through the Arctic Archipelago (Map 4). The navigation through the Northwest Passage has economic advantage as shown in the map the traditional route is shown in blue the route through NWP is shown in red line. By avoiding traditional routes through Panama Cape Horn, a ship can eliminate reduce a distance between 4000 and 8000 nautical miles. But the experts like Franklyn Griffith argue that sailing through the NWP is dangerous and risky task even in the moderate ice condition (Griffith 2003). The use of the Northwest Passage as a shipping route has attracted the attention not only of environmental activists but also Canadian sovereignty advocates and proponents of the freedom of the seas (Krafft 2009).

(ii)The another advantage is the Arctic shipping lanes running in politically stable and peaceful region which is capable in managing the sea routes and ensured safe navigation (Willett 2012) by reducing the threats like piracies which are common in the sea routes from the Indian Ocean.

(iii)The Arctic shipping routes run through resources rich location which has benefit for the shipping (Willett, 2012) by providing transportation of goods from both sides.

### **Challenges in the Polar Seas**

Scott Borgerson states, “Climate change may transform the Arctic Ocean into a third waterway for transcontinental traffic into North America. The result is that the northern tier will become open to the benefits and exposed to the potential costs of worldwide commerce” (Borgerson 2008).

### **Environmental & Governance-related Challenges:**

The melting of ice and increasing human activities are a severe threat to the Arctic environment. The global warming and melting of the ice have a devastating impact on the biodiversity of the Arctic. Many animals like polar bears, ice-dependent seals, walruses and ice-dependent sea birds would face the threat of extinction, as the animals rely on the ice for essential habitat, foraging and reproductive activities and for born or new born lives. Over fishing has led to depletion of rare variety of fishes. Though some steps has been taken to prevent fishing. *Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). As its name implies, the Convention is focused on conserving Antarctic ecosystems. Fishing is allowed, but with important restrictions: any fishery can only have a very limited impact on the ecosystem and should be managed in a way that minimizes risk to ecosystems. This precautionary, ecosystem-based approach ensures that decisions about fishing consider the needs of other species. Now, all fishing activity in the ocean around the Antarctic Continent is strictly regulated by this convention.*<sup>4</sup>

**Pollution:** The pollutants are the most dangerous threat for the polar region environment. There is a risk to Arctic ecosystems from oil spills which may caused by several reasons

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<sup>4</sup> <https://www.ccamlr.org/>

like exploratory drilling, production, pipelines, terminals and shipping, militarisation and other human activities.

Oil Spill: In the icy waters of the Arctic the oil spill takes significantly long time even decades. Lack of sunlight and freezing temperature inhibits the breakdown of oil. The flowing oil locked up or sandwiched under the various levels of ice and then released when the ice melts. The Arctic ecosystem has not got rid of the devastating impacts of the Exxon Valdez oil spill<sup>5</sup> that occurred 29 years ago. According to BBC News,” around 250,000 seabirds, nearly 3000 sea otters, 300 harbour seals, 250 bald eagles and up to 22 killer whales died as a result of this spill.”(BBC, 24 March 1989). Similarly, an event of oil spill took place in the Russian Arctic. An oil spill which occurred in the Russian Arctic in late April 2012 took nearly 36 hours to get the leakage under control. It has been estimated that 2,200 tons of oil were spilled out over at least 1,5 square kilometres of tundra, including reindeer grazing grounds (Stange 2012).

Shallow waters are the more prone to pollution, and these areas are important to organisms of all levels of the Arctic food chain. The oil spills in such areas cause “extensive acute mortality in plankton, fish, birds, and marine mammals ... [and] there would also be significant ... physiological damage, altered feeding behaviour and reproduction, and genetic injury that would reduce the overall viability of populations”. Because Arctic animals tend to be concentrated around open areas of water within the ice, a nearby spill could have a “devastating population level effect”<sup>6</sup>.

Similarly the Antarctica has also experiences the oil spill cases in January 28, 1989, when the Bahia Paraiso, a 435-foot, double-hulled tourist ship operated by the Argentine navy, ran aground in clear weather off the northern tip of the Antarctic Peninsula, The 81 tourists and crew of 235 safely abandoned the ship before it rolled over on its side 4 days later in 50 feet of water. It had a 30-foot gash in its side. About 250,000 gallons of diesel fuel were stored on board, in bulk and in 55-gallon drums; about 170,000 gallons of fuel

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<sup>5</sup> In March 1989, the Exxon Valdez's ran aground near the Prince William Sound in the Gulf of Alaska. Some 2,000 km of stretch was affected by the oil spill over and years later, some areas were still found contaminated with the oil residues, because of the low temperature of Alaska. It was the largest marine spill in the vicinity of the Arctic and led to the death of birds and animals and local flora and fauna.

<sup>6</sup> House of Commons UK 2012

were lost. Within a few days after the accident a 15-mile-long slick covered an area of about 10 square miles and had reached the beaches and rookeries surrounding the United States' Palmer Station research center, killing krill and oiling seals, penguins, cormorants, skuas, and giant petrels, the entire brood of skua chicks in the Palmer area was lost. The NSF responded within 36 hours by sending 52 tons of U.S. Navy clean up equipment along with 15 oil spill experts from the United States, Argentina, and Chile. NSF has spent about \$2.5 million to date on its response efforts. Removing the fuel remaining on board will cost about \$3 to \$5 million, Another \$50 to \$60 million might be required to remove the ship and to sink it in the open ocean, The accident raised several question and concerns about the Antarctica's fragile environment is vulnerable to oil spills, even without petroleum development and failure of countries conducting research in Antarctica are poorly equipped to deal with the incidences of oil spill . Even if clean up equipment is available, much valuable response time can be lost shipping the equipment to the spill site (Mason and Legges,1999)

### **Conclusion**

The global warming made the both the Polar seas the Arctic and Antarctica accessible. The USGS assessment 2008 that Arctic sea bed contains huge reserves of hydrocarbon, natural as, diamonds and silver, that added a geo-economic dimension to the Arctic region. The Arctic resources have attracted the industrial economies looking for alternative hydrocarbon resources due to the troubled Middle East region. This attraction is further intensified because the shorter Northern Sea Route has become navigable which has facilitated the resource extraction and its transportation to the destination. The Northern Sea Route is shorter, thus fuel-saving and time-saving, and the most important part is that it is in the peace zone. The trading nations and companies are facing trouble because of notorious elements like pirates on the South China routes and political turbulence in the Middle East; the new routes have advantage over the old ones like the PanamaSuez-Canada routes which are unable to accommodate megaships (Borgerson 2008). All these have made the Arctic region a centre for geopolitics. There is possibility of militarisation in the Arctic due to conflicting of interests of the different actors. Almost all the Arctic nations are escalating their armed forces in the Arctic. The military

activities and other human activities like mining and oil spill, tourism, etc. are major threats for the Arctic environment. There are several reasons which have made the Arctic Ocean vulnerable to pollution. The most important threat is the oil spill which may be caused due to running ships or oil drilling. Due to a low temperature of the Arctic waters and the long cold frozen season, it takes decades to dissipate the oil.

Though the Antarctica is demilitarized yet due increasing temperature has made it ice free and economic activities to tourism and fishing this also not immune to the incidence of oil spill. The fishing has led to depletion of marine resources and fishery.

Thus, it is clear that though that the global warming has benefited blue economies like fishery, tourism, oil exploration, shipping in the both Polar Oceans the Arctic and the Antarctica Ocean on environmental coast which the world must be ready to pay.

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