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Cyclone Phailin in India: Early warning and timely actions saved lives

Effective disaster planning, preparation and dissemination of early warning information led to a minimal death toll in the wake of the strongest cyclone to hit India in 14 years. In mid-October, Cyclone Phailin swept over the Bay of Bengal and across the eastern coast of India, causing hundreds of millions of dollars in damage and affecting the livelihoods of 13 million people. The evacuation of more than a million people in the states of Odisha and Andhra Pradesh in response to effective early warnings resulted in a much lower death toll than a catastrophic cyclone of similar strength that struck in 1999, leaving 10,000 people dead. Continued early warning efforts could have similar positive results in the future, and when accompanied by good communication and adequate preparation, impacts of disasters could be mitigated or even prevented. This bulletin will focus on the lessons learned from Cyclone Phailin and how they can be applied to other disasters such as the recent Typhoon Haiyan.


Storm surge during Phailin reached 3.5 metres in some areas.

Why is this issue important?

On the evening of October 12, 2013 a very severe tropical cyclone, Phailin, brought torrential downpours, damaging winds of more than 220 kilometres per hour (km/h) and storm surges of up to 3.5 metres (m) to the eastern Indian states of Odisha and Andhra Pradesh (GoO, 2013). A satellite image of Cyclone Phailin is pictured in Figure 1. The impacts of Phailin and ensuing floods affected more than 13.2 million people, left five districts of Odisha under water, and caused hundreds of millions of dollars (GoO, 2013) in damage to homes, schools, crops and the fishing industry (Froberg, 2013). However, early warning alerts, disseminated four days before Phailin struck land, allowed for the evacuation of approximately 400,000 people on or by 11 October (Senapati, 2013). Ultimately, a total of nearly 1.2 million people were evacuated (GoO, 2013), resulting in the largest evacuation operation in India in 23 years (IFRC, 2013). Early warning also allowed for the relocation of more than 30,000 animals. A total of 21 lives were lost as a result of the cyclone and an additional 23 lives due to severe flash flooding in the aftermath of the cyclone (GoO, 2013). A comparable cyclone, Cyclone 05B, hit the same area in 1999 with winds of up to 260 km/h (IFRC, 1999), but had a much

more devastating outcome: more than 10,000 lives were lost (World Bank, 2013). Government cooperation, preparedness at the community level, early warning communication and lessons learned from Cyclone 05B contributed to the successful evacuation operation, effective preparation activities and impact mitigation. This event exhibits the importance, benefits and effectiveness of the use of early warning for a massive disaster.

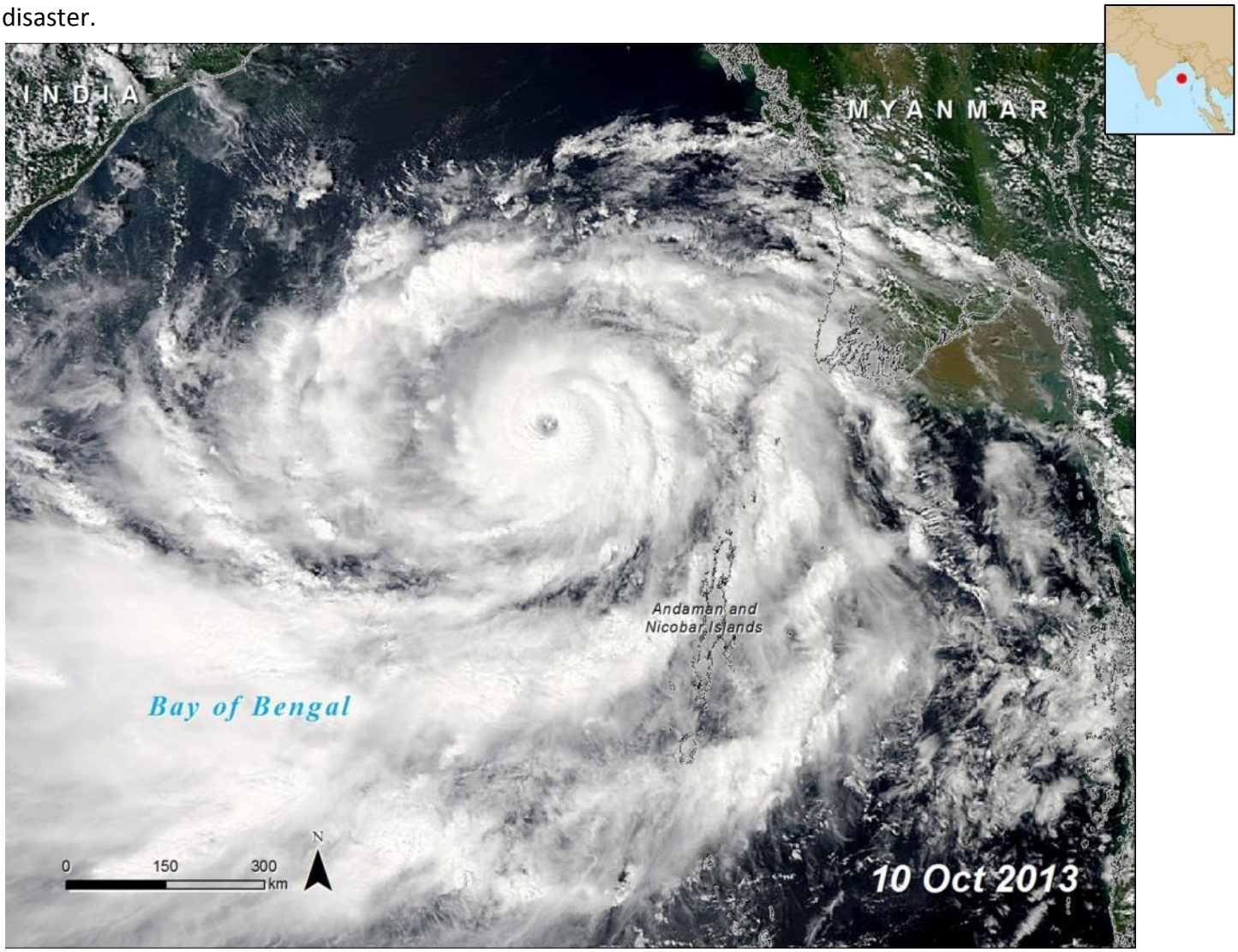

Figure 1. NASA MODIS Aqua image of Tropical Cyclone Phailin circling over the Bay of Bengal, moving west towards India, on October 10, 2013. (Credit: NASA MODIS Rapid Response Team in Gutro, 2013; visualisation by UNEP/GRID-Sioux Falls).

What are the findings?

From 1970 to 2010, the Asia-Pacific population living in cyclone-prone areas increased from 71.8 million to 120.7 million, expanding the magnitude of vulnerability to disasters (ESCAP and UNISDR, 2012). However, significant improvements in disaster management, preparedness, forecasting capabilities and early warning, such as the improvements exhibited by India during Cyclone Phailin in October 2013, have helped to mitigate some disaster-related impacts. Preparedness and early warning communications

Cyclone shelter in Ganjam district.

and activities had been much improved since the comparable Cyclone 05B 14 years earlier (Singh, 2013). In response to Cyclone 05B in 1999, Odisha established the first state agency in India to address disaster management specifically (Odisha State Disaster Management Authority – OSDMA) (World Bank, 2013). This initiative has led to the construction of 200 new cyclone shelters, operating in places such as schools and community centres to ensure regular maintenance (Singh, 2013). Cyclone shelters have proven to be useful as 75 shelters operated by the Indian Red Cross provided safety to more than 100,000 people during Phailin (Mukherji and Agarwal, 2013) with some shelters holding up to 500 people (Froberg, 2013).

Regarding forecasts, the India Meteorological Department (IMD) was able to predict wind velocity more accurately, contributing to better forecasts and more effective early warning communications (TOI, 2013). Warnings from the IMD were disseminated as early as four days before Phailin made landfall, as compared with two days of warning provided for Cyclone 05B in 1999 (Senapati, 2013). In addition to early warning alerts that prompted evacuations, precautions to protect cattle were taken and reservoirs were lowered to mitigate anticipated flooding (GoO, 2013). Also, preparedness meetings were held among various Disaster Response Teams in Odisha and volunteer teams, such as the International Federation of Red Cross (IFRC), were also on hand to assist with evacuation and relief (IFRC, 2013).

Early warning prompted fishermen to come in from sea before the cyclone made landfall, but many boats were too heavy to carry to safety, resulting in piles of boats along shorelines.

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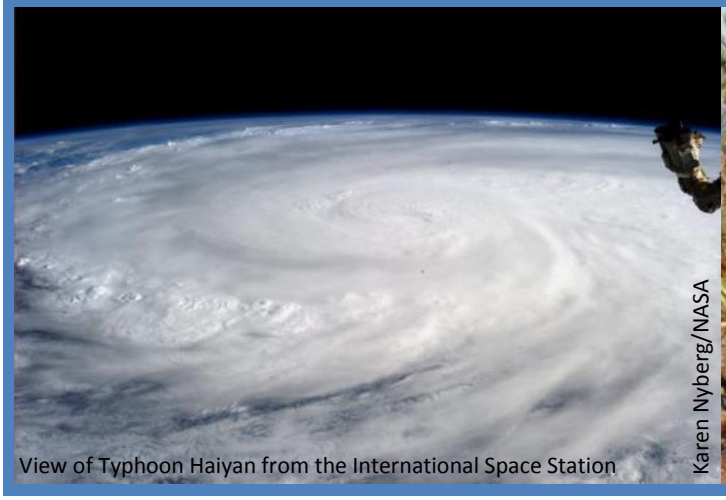
Box 1. Typhoon Haiyan (Yolanda), the Philippines

Less than four weeks after Cyclone Phailin made landfall in India, Typhoon Haiyan (locally known as Yolanda), one of the largest super typhoons ever to make landfall on earth, brought heavy rains, raging storm surges and damaging winds to the Philippines and Viet Nam. Haiyan made landfall in the Philippines six times, beginning on 8 November (NDRRMC, 2013), causing storm surges of up to 7 m on the island of Leyte, one of the hardest islands hit, and wind gusts up to 312 km/h (OG, 2013). The Philippines is extremely vulnerable to typhoons, both geographically and economically (ESCAP and UNIDSR, 2012); Haiyan is the 24th storm to hit this year (NASA, 2013). Geographically, the Philippines is situated in the western Pacific Ocean, with not much to break the force of storms that sweep over the water (Vergano, 2013). The lack of natural protection makes its agricultural lands, which cover about 40.6 per cent of the land area (World Bank, 2011), and its 96.7 million residents very vulnerable (World Bank, 2012). Damage estimates thus far to agriculture land from the impact of Haiyan top US$200 million and the storm has affected the livelihoods of approximately 9 million people, and resulted in a death toll close to 4,000 (NDRRMC, 2013), a number expected to increase once all provinces are accounted for. Hundreds of thousands of people were evacuated from the Philippines and Viet Nam in response to early warnings, including 1,000 from the tiny island of Tulang Diyot in the Philippines which saved its entire population as all 500 homes on the island were destroyed (UNISDR, 2013), but not all were so lucky. Some refused to leave their homes, could relocate only within their cities, or could not take refuge in a structure that could withstand the storm (Mersereau, 2013; BBC, 2013). Given the intensity of the typhoon, some shelters in the Philippines were unable to survive the heavy rains and intense winds, endangering those who took shelter here (AP, 2013; Ehrenfreund, 2013). The case of Haiyan highlights the many challenges encountered when a storm approaches and when relief efforts begin, including excessive resources needed to accommodate evacuation, increased vulnerability to extreme wave and wind action, including the vulnerability of typhoon shelters themselves, travel over difficult terrain during both evacuation and relief efforts and the necessity of community cooperation with local and national officials (Mersereau, 2013; Ehrenfreund, 2013).



View of Typhoon Haiyan from the International Space Station

Karen Nyberg/NASA

A child among destruction in Leyte province, Philippines

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Several means of communication were exercised in the days prior to the landfall of Phailin to disperse early warning information. Different means and methods of communication are essential to reaching a large population. Examples of the means of communication included:

- Constant news coverage before and throughout the event, including broadcasts of Doppler radar information providing coordinates of location, intensity and timing of impending cyclones (Jain, 2013);

- Use of email, fax, telephone and print media to communicate warnings and alerts (GoO, 2013). including mobile sending phone text message alerts to more than 10,000 people in Andhra Pradesh the day before the cyclone made landfall (Price, 2013);
- Warnings and alerts delivered by the IMD through channels such as online news networks (Kumar, 2013);
- Loudspeakers used in various districts to warn residents of impending danger and to warn fishing boats that were out at sea (Senapati, 2013); and
- Distribution of satellite phones to representatives in the 14 most vulnerable districts to ensure that warning communications continued during the storm (GoO, 2013).

Benefits of early warning in coastal districts

Many coastal villages bore the brunt of Cyclone Phailin's impact. Early warning enabled coastal villages to be evacuated, especially those in Puri and Ganjam districts in Odisha. As many as 102,000 residents of Puri district and 180,000 residents of Ganjam district were evacuated (GoO, 2013). Ganjam and Puri districts were two of the few districts that received special warnings from the OSDMA on 10 October, two days before the cyclone's landfall, to evacuate those living in mud houses and low lying areas before the morning of 12 October. According to the IMD, Puri district experienced the worst winds of the cyclone with windspeeds up to 223 km/h and received 221.6 millimetres (mm) of rain between 9 October and 14 October and its western neighbour, Khurda district, received the most rain with 273.3 mm over the same time period (GoO, 2013).

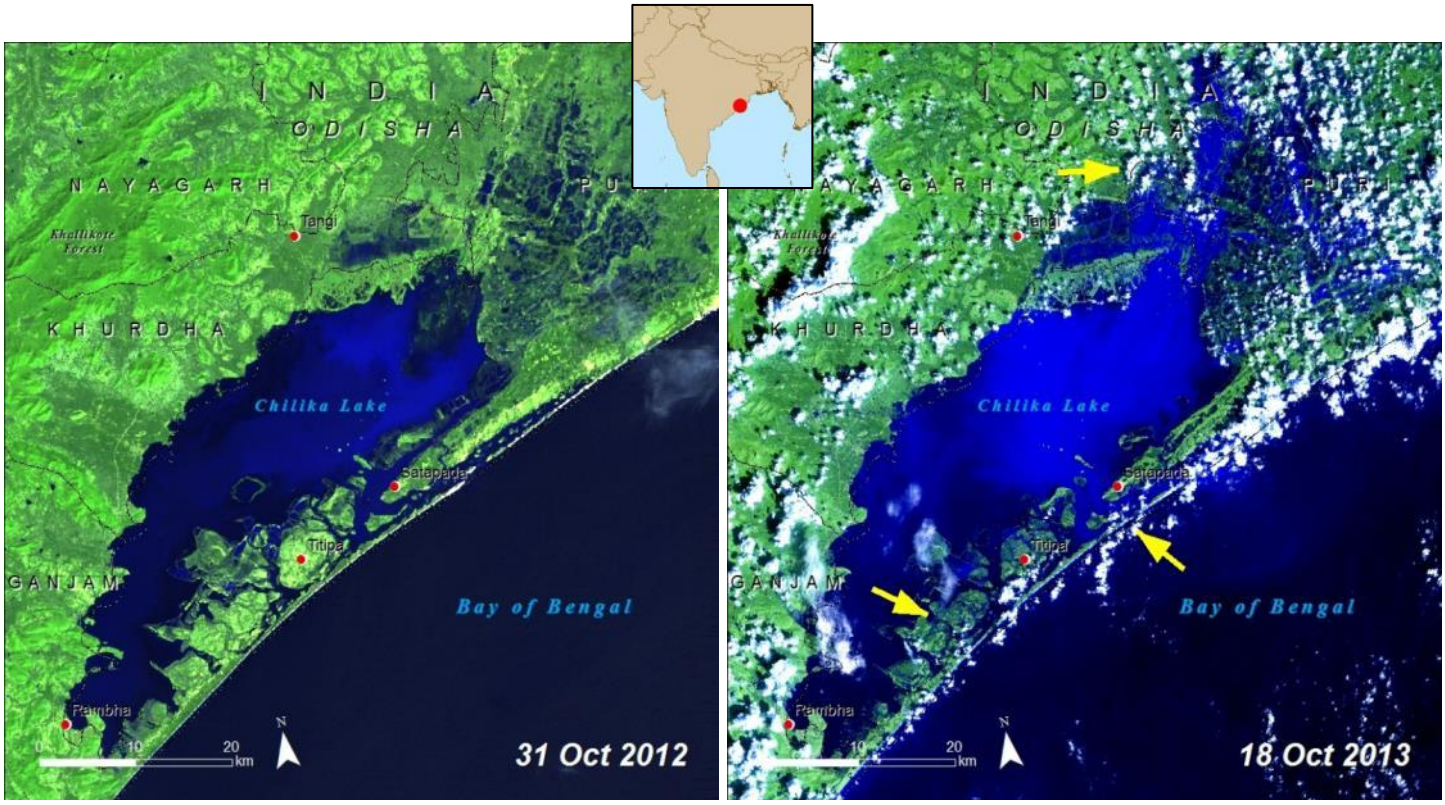

Figure 2. False-colour Landsat satellite images of Chilika Lake in 2012, when the coastline was intact, and six days after Phailin in 2013, when the coastline had been breached. Images: USGS/NASA; visualisation by UNEP/GRID-Sioux Falls.

Evidence of the rainfall is exhibited by the influx of Chilika Lake, Asia's largest brackish water lake (Barik, 2013) (Figure 2), which is bordered by Khurdha, Puri and Ganjam districts and the Bay of Bengal. Approximately 40,000 villagers who live among the islands scattered in and around Chilika were able to evacuate prior to the cyclone's landfall, a challenging feat considering the logistics required to get from an island to the mainland

(Barik, 2013). But the environment was not as fortunate. The cyclone breached the natural coastal barrier of Chilika, destroying kilometres of its delicate mangrove forests, which are favoured by some migratory species (Mohanty, 2013) and several endangered plants and animals (Chauhan, 2013). A significant proportion of casuarina forests, which served as a protective barrier for residents of the area, were buried by sand (Mohanty, 2013). Damage to Forest Department infrastructure is approximated at US$27,000 (Mohanty, 2013). Yellow arrows in Figure 2 indicate significant areas of change between the extent of the lake in October 2012 and the extent a few days after Phailin dissipated. Now that the barrier between Chilika and the Bay of Bengal has been breached, protection from future events is compromised (Mohanty, 2013), demonstrating the importance of continued early warning efforts, establishment of new damage-control mechanisms, restoration of forest ecosystems, and incorporation of ecosystem-based adaptation measures.

What are the implications for policy?

Globally, the number of lives lost to hydro-meteorological disasters, such as cyclones, has decreased 10 times, yet the recorded economic losses have increased 50 times (Golnaraghi et al., 2009). Golnaraghi et al. (2009) explain that the decrease in loss of life can be attributed to the formulation of policies pertaining to disaster risk reduction (DRR) and linking national and local levels to development of early warning systems (EWS), preparedness and planning. In addition, as countries continue to develop and urban growth increases, the quantity of assets exposed to disasters will increase as well (ESCAP and UNISDR, 2012). To reduce future economic loss and impacts on livelihoods, overarching DRR management plans, in conjunction with EWS, could be developed to establish medium- and long-term plans that address appropriate land use zoning, development of infrastructure and agricultural planning (WMO, n.d.). Examples of disaster risk management activities identified by the OSDMA in its Disaster Risk Reduction Programme include urban vulnerability assessment and mapping, amending building codes accordingly and increasing access to local level financial mechanisms and mitigation funds (OSDMA, 2012). Financing mechanisms such as cash transfer programmes for immediate offsets of costs, weather-related insurance and planning could also accompany these plans to help mitigate economic impact.

The World Meteorological Organization (WMO) regards political recognition of the benefits of developing and implementing EWS at the local and national level as one of ten principles of EWS good practice (WMO, 2011). The role of cooperation and effective communication between local and national officials was evident during Cyclone Phailin. It was reported that coordination between the local and national levels was “remarkably good,” which helped lead to successful preparedness efforts (Jain, 2013). For governments looking

Beginning the clean-up efforts

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to emulate the collaborative approach the Indian government took, policies could be put in place to encourage participation at local and national levels for early warning communication, recovery and relief efforts. Moreover, the involvement of the community and the private sector are also essential to the establishment and implementation of prevention policy (UNISDR, 2007).

The Odisha government, with support from the World Bank National Cyclone Risk Mitigation project, has spent US$255 million on increased disaster preparations including building shelters, evacuation planning, conducting drills and strengthening embankments (World Bank, 2013). Since its inception in 2011, the project has helped to increase disaster preparedness and early warning communication down to the local level (World Bank, 2013). A reported 148 additional evacuation shelters are to be built under this project and 28 were operational during Phailin (Singh, 2013). It is the World Bank's first project in India concerning preventative disaster risk management (World Bank, 2013).

However, to address the increasing economic losses that occur as a result of a disaster, in addition to development of risk management plans discussed previously, support of adequate disaster relief should accompany early warning efforts to aid in a full and speedy recovery. In the days following Phailin's landfall, several measures were taken to jumpstart the recovery effort. The Indian Army, Navy, Air-Force, National Disaster Response Forces (NDRF) were called to action for emergency and relief efforts, helicopters distributed food rations and the Red Cross emphasized the distribution of safe drinking water as a top priority for those involved in relief efforts (IFRC, 2013). Successful and unsuccessful results of recovery efforts can be assessed by policy and decision makers when developing and improving future early warning systems and risk management plans and evaluated for effectiveness to ensure improvement to the system over time (WMO, 2011). Early warning and response activities for Phailin exhibited major improvements over those performed during Cyclone 05B in 1999 due to the evaluation and inclusion of lessons learned.

Loss of lives in the case of Cyclone Phailin was minimised by effective early warning communication supported by joint efforts from the community, volunteer organisations, local and national levels of government and by donors, but also by the level of preparedness the community and local and national government exhibited. The destruction and impacts of Typhoon Haiyan demonstrate the need for the further strengthening of early warning systems in conjunction with increased preparation efforts and government and community cooperation. For both India and the Philippines, the focus is now directed to relief and recovery efforts and identifying lessons learned to reduce the impacts of future disasters that are imminent in the Asia-Pacific.

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Writer: Lindsey Harriman[a]
Production and Outreach Team: Arshia Chander[a]*, Ashbindu Singh*[a,b]*, Erick Litswa*[b]*, Kim Giese*[a]*, Lindsey Harriman*[a]*, Michelle Anthony*[a]*, Reza Hussain*[a]*, Tejaswi Giri*[a]*, Theuri Mwangi*[b] *and Zinta Zommers*[b]
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([a] UNEP/DEWA/GRID-Sioux Falls, [b] UNEP/DEWA-Nairobi, [c] UNEP/DEWA/GRID-Geneva, [d] Munk School of Global Affairs, University of Toronto).

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