

POLLUTION OF WATERBODIES

Treating textile wastewater can make a difference

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THE textile processing industries produce wastewater which is one of the main sources of pollution of the rivers, canals and wetlands in and around Dhaka as well as many other places in the country. Effluents from these industries contain suspended solids, large amount of dissolved solids, un-reacted dyestuff and other chemicals that are used in different stages of dyeing, fixing, washing and other processing.

The textile wastewater treatment technologies aim at achieving color removal and reduction of Total Dissolved Solids (TDS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and pH correction. Treatment processes include physical, chemical and biological methods; and they have merits and limitations. To meet the environmental requirements, researchers have been making efforts to use a combination of two or more methods for producing an environmentally acceptable effluent from the treatment facility. Combination of chlorination and chemical coagulation is reported to meet the environmental requirements for textile wastewater treatment.

Chlorination of wastewater

was practiced for reducing BOD as long ago as in 1859 in England and this was effectively employed for treating industrial wastewater in Germany and USA. Because of high cost of chlorine, the industry then looked for alternative chemicals and treatment system which has led to chemico-physico treatment process requiring more equipment and increased investment and operating costs.

Chlorine is also a raw material for large number of more valuable chlorinated organic and inorganic products. However, where chlorine is cheap or available as an otherwise unusable product, its use in the treatment of wastewater can be a viable and practical option.

Sources of chlorine can be either chlorine gas in cylinder or in-situ electrochemical chlorine. The aqueous chlorine as a chemical oxidant produces one atom of oxidizing power per mole of chlorine. Thus 71 kg of Chlorine will deliver 16 kg of Oxygen for the desired oxidation process. In spite of the complexities of chlorine oxidation process, chlorine offers the advantage for its ability to destroy colours, odours, organics, inorganics, cyanide, phenols, detergents etc. Moreover, chlorination renders treated water disinfected.

The Department of

The effective but cheap approach based on chlorine gas provides an opportunity for both the industry and DoE to perform in a win-win situation. With true and honest commitment to serve the people by ensuring a clean environment, both the parties should strive hard to operate ETPs for complying with ECR-97 requirements.

Environment (DoE), as per the Environment Conservation Rules-1997 (ECR-1997), has set the following standards for the effluents to be discharged from composite textile plant and large processing unit.

Parameters	Standard
pH	6.5-9
Suspended Solids (mg/l), ppm	100
BOD ₅ * 20oC (mg/l), ppm	150
Oil and Grease (mg/l), ppm	10
Total Dissolved Solids (mg/l), ppm	2100
Wastewater flow (liter/kg fabric processed)	100
Total Chromium as (mg/l), ppm	2**
Sulfide as S (mg/l), ppm	2**
Phenolic Compounds as C ₆ H ₅ OH (mg/l), ppm	5**

* BOD limit of 150 mg/l implies only with physico-chemical processing

** Special parameters based on type of dye used

DoE has not yet established methods/procedures for measuring these parameters. The standard does not specify any value/standard for dissolved oxygen (DO), COD, free chlorine and colour. For aesthetic reason, the treated water shall be colourless and clear and odourless. If the limit for BOD is 150 ppm, the

effluent is unlikely to have significant DO at the point of discharge.

The organics present in the wastewater can react with dissolved chlorine forming chloro-organic compounds.

The reaction depends on the type of organics (alkanes, alkenes etc), pH and availability of chlorine. Efforts are made to minimise the formation of these compounds. Chlorination of drinking water or treated wastewater for disinfection has the same limit and still recognised as the most effective means for

disinfection.

Why this process?

With the passage of the Environment Conservation Act in 1995 and the notification of Environment Conservation Rules in 1997, the Department of Environment, Bangladesh has since then pursuing the textile sector in particular to build and operate wastewater treatment plants.

In view of the investment cost of an ETP (Effluent Treatment Plant) plus its operating expenses for chemicals and aids which are imported items, the industry has been responding slowly. The wastewater treatment method based on chlorine gas if adopted by this sector, the situation can change in favour of ETP operation as the process is simple and can be operated at a relatively low cost because of low cost of chlorine in the country.

Functions of chlorination such as: elimination colour and odour, reduction of BOD and COD, oxidation of metal ions, destruction of cyanides

and phenols, removal of scum, grease and detergents, and control of foams and flies plus disinfection serve all the objectives of the treatment of textile wastewater composition of which is not as wild as sewage. The handling of chlorine gas may appear risky, but its wide use in water treatment in hundreds of locations by the process industries and WASA assures that it can be handled safely by following related procedures.

Treating textile wastewater with chlorine gas

For the past six months from November 2008, the textile wastewaters have been treated with chlorine gas in the existing ETPs at a number of textile composite industries around Dhaka. The ETPs have been slightly modified to introduce chlorinated water from the chlorine dispenser. The ETPs have been producing effluents that meet the requirements of ECR-97 (Schedule 12-B) according to the tests and analysis performed at the reputed laboratories including DoE.



Operating experiences reveal that the cost of chlorine consumed is very low compared to the chemicals and aids used previously.

Win-win situation

The priority and emphasis today are to make the industry treat its wastewater. The objective is compliance by the industry to achieve the standards for effluents by operating an ETP. DoE's performance is to be judged by how many industries operate ETP for treating their wastewater and to what extent the set standards are achieved and thus water bodies preserved.

This effective but cheap approach based on chlorine gas provides an opportunity for both the industry and DoE to perform in a win-win situation. With true and honest commitment to serve the

nation and its people by ensuring a clean environment, both the parties should strive hard to operate ETPs for complying with ECR-97 requirements. The textile wastewater treatment with chlorine gas can make all the difference by doing something positive rather than being smart by doing nothing purposefully.

DoE, Bangladesh created in 1995 now working with two gazette notifications. Whatever, we expect that DoE will come forward to support all endeavors to push for effective and efficient use of ETPs in textile industries and thus protect and preserve our environment, especially water bodies.

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Cyclone Aila and climate change

El Nino/La Nina intensifying the threat?

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ACCORDING to the Associated Press, some 2.3 million people were affected by Aila, many of them stranded in flooded villages. Storm surges in Bangladesh flooded agricultural areas with salty water. Home to roughly 25,000 residents, the coastal island Nijhum Dwip was reported to be completely submerged. As of May 27, many rural villages had not yet been reached by relief workers, and the death toll was expected to rise significantly as search and rescue efforts continued.

As mentioned in Audity Falguni's article on June 01 in The Daily Star (entitled 'Aila after Sidr'), we should be thankful to the nature as the level of damage was far less this time, when compared to Cyclone Sidr of November, 2007. The death toll unofficially claimed to be about 200.

Now if we synthesize the most recent cyclone history, we seem to have already experienced three major cyclones - Sidr in 2007, Bijli and Aila in 2009. Upon watching carefully, we can identify that a moderate La Nina event started in early 2007 and lasted for a long time before it started to gradually weaken in April 2009 with increasing chances for transition from La Nina to neutral conditions. Also, from a historical perspective, it has been observed that many other major cyclones that hit Bangladesh

were in El Nino or La Nina years. So, the question can be raised now -- do El Nino/La Nina events intensify the threat of cyclone activities in Bangladesh?

The answer is yes, as there are reasons to believe that the influence of El Nino and La Nina events intensify the threat of Cyclone [Note that the terms El Nino and La Nina represent opposite extremes of the ENSO cycle. El Nino reflect periods of exceptionally warm sea surface temperatures across the eastern tropical Pacific while La Nina represent periods of below-average sea-surface temperatures across the eastern tropical Pacific. In general, El Niño indicates drier than average climate (like the drought in 1982-83 and 1998) and La Niña indicates wetter than average climate (like the flooding in 1988 and 1998) in Bangladesh]. To provide some background, presented below are the top cyclones (since 1960) and the activities of El Nino/La Nina events during those years:

May 28 - 29 May, 1963: A severe cyclonic storm lashed Chittagong, Noakhali, Cox's Bazar and coastal islands of Sandwip, Kutubdia, Hatiya and Maheshkhali, killing about 11,520 people. A moderate El Nino event was active in the Pacific basin during that time. The onset of that El Nino event took place in the earlier part of 1963 and lasted for about three full years.

November 12, 1970: A cyclone hit the entire coast of

Most of the major cyclones that hit Bangladesh in different periods were either a year of El Nino or La Nina event, or a transitioning period from one to other event. Some scientists theorize that the increased level of El Niño/ La Nina events observed over the last few decades is, at least in part, the result of global climate change.

Bangladesh with a maximum wind speed of 222-km per hour causing 10 to 20 feet of high tidal surge. The official death toll was 500,000, but the unofficial figure was about 120,000. A strong to moderate La Nina event was active during that time. Actually, the onset of that La Nina event occurred in the later part of 1970 and lasted until the earlier part of 1972.

May 24 - 25, 1985: A severe cyclone hit Chittagong, Cox's Bazar, Noakhali and coastal islands causing 10 to 15 feet of high tidal surge, killing about 11,069 people. A moderate La Nina event was active during that time. The onset of that La Nina was in the later part of 1984 and lasted until the end of 1985. Then the El Nino event started in 1986.

April 29 - 30, 1991: A cyclone hit Bangladesh at late night of April 29. The storm originated in the Pacific Ocean and reached the Bay of Bengal coast after 20 days. The maximum wind speed reached 225-km per hour. Official death toll was 150,000. A moderate El Nino event was active during that time. The onset of that El Nino event occurred in the later part of 1990 and lasted for about two full years.

November 29 - 30, 1997: A

cyclone hit Chittagong. The maximum wind speed was 224-km per hour. A strong El Niño event was very active during that time.

November 15, 2007: Cyclone Sidr is the fourth named storm of the 2007 North Indian Ocean cyclone season. The storm formed in the central Bay of Bengal, and quickly strengthened to reach peak sustained winds of 215 km/h (135 m/h). The storm eventually made landfall near Bangladesh on November 15. As it intensified to a Category 4-equivalent cyclone on November 15, thousands of emergency officials were put on standby in Bangladesh in advance of the storm's arrival. Massive evacuations of low-lying coastal areas also took place; a total of 650,000 people evacuated to emergency shelters. Approximately 3,447 deaths were blamed on the storm according to governmental sources. Agencies like Save the Children or Red Crescent Society claimed the number of deaths to be within 5,000 to 10,000 in Sidr. For the year 2007-08, a La Nina of moderate strength was established in the central and eastern Pacific. This La Nina event started to develop in January 2007 and it remained active until the end of 2008.

April 14-15, 2009: Cyclonic Storm Bijli was the first tropical cyclone to form during the 2009 North Indian Ocean cyclone season. The worst hit were the ports of Chittagong and Cox's Bazar, where Bijli brought heavy rain and wind gusts of up to 90 kilometers an hour. Officials said that hundreds of thatched houses were destroyed but that the damage was minimal, in part because of evacuation efforts. More than 200,000 residents took refuge in shelters, and authorities ordered boats to stay close to the shore. This was the time when La Niña started to gradually weaken with increasing chances (greater than 50%) for transition from La Niña to ENSO-neutral conditions.

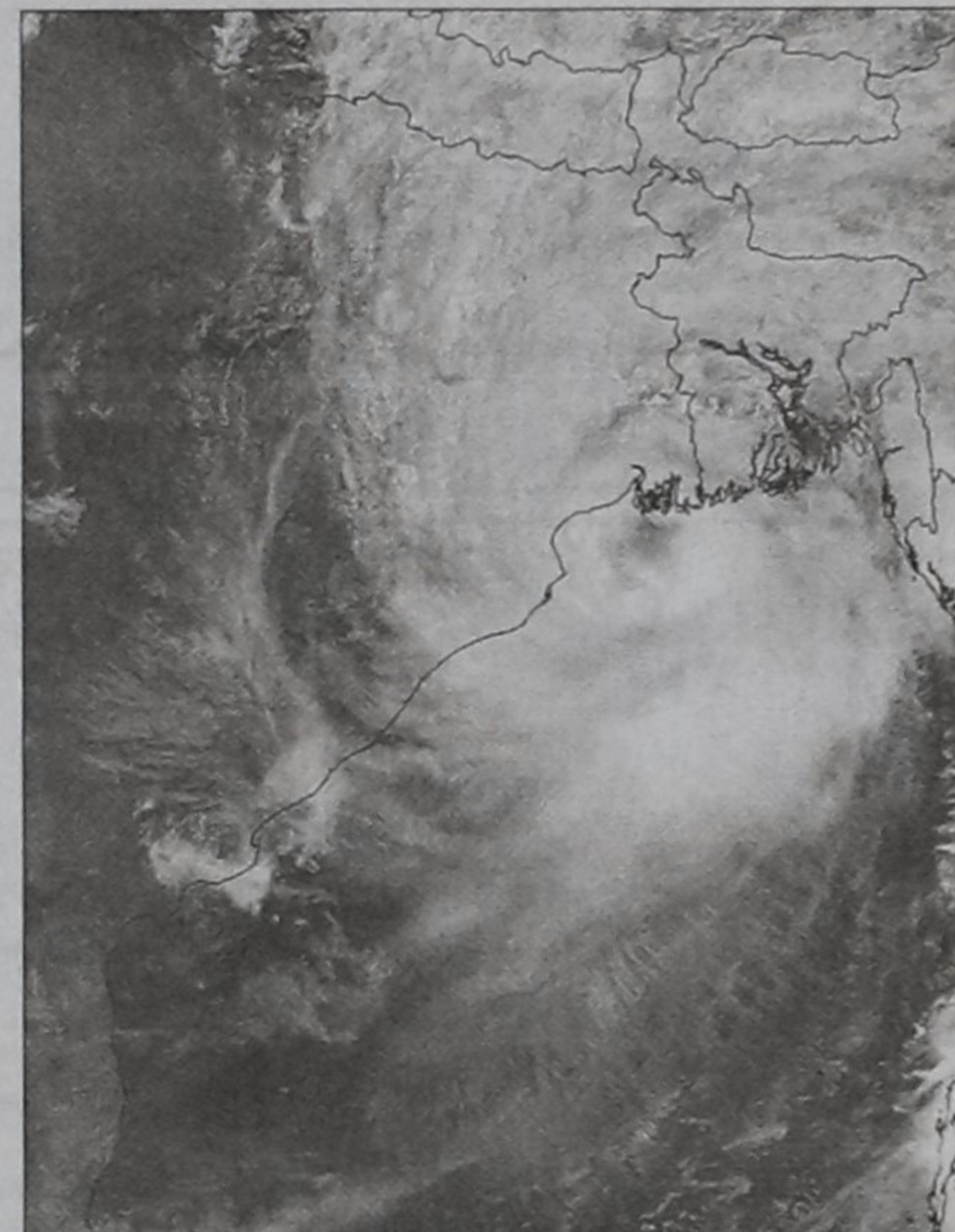
May 25, 2009: Tropical Cyclone Aila hit Bangladesh. This is the time when the equatorial Pacific Ocean is expected to be transitioned from La Niña to ENSO-neutral conditions, ending the 2008-09 La Niña. However, the equatorial Pacific has been found to be warmed (i.e., El Niño like event) to the positive half of the neutral range, after weak La Nina conditions ended early last month. While most of the dynamic and statistical models forecast that during the May-July season

there is an approximately 75% probability of maintaining ENSO-neutral conditions, some model forecasts stated that the probability for El Niño conditions rises to 45%.

The above chronology shows that most of the major cyclones that hit Bangladesh in different periods were either a year of El Niño or La Niña event, or a transitioning period from one to other event.

According to BBS (1993, 2002d), from a statistics of recorded cyclones over the last 200 years, it has been found that number of occurrences of major cyclones has drastically increased in the recent decades. While the number of cyclones was 3 during the period of 1795-1845 and 1846-1896 respectively, the number increased to 13 during 1897-1947 and 51 during the period of 1848-1998.

Also, as compared to 1950-1980 (we don't have any data related to El Nino/ La Niña events before 1950); the numbers of El Nino/ La Nina years have considerably increased in 1981-2009. This trend is likely to continue further, may be with more frequent El Niño/ La Niña events. Some scientists theorize that the increased level of El Niño/ La Nina events observed over the



Tropical Cyclone Aila struck southern Bangladesh and eastern India on May 27. The Moderate Resolution Imaging Spectroradiometer on NASA's satellite captured this true image of Aila on May 25, 2009, the same day that the storm temporarily strengthened to a Category 1 cyclone. Aila almost completely fills this scene, stretching from the Bay of Bengal deep into India, Bangladesh, and Myanmar. On May 25, Aila's wind speeds ranged from 74 kilometers to 120 kilometers per hour.

Source: <http://rapidfire.sci.gsfc.nasa.gov/gallery/2009145-0525/AilaA2009145.0455>

last few decades is, at least in part, the result of global climate change -- and the anticipated effects of climate change is the possible increase in both frequency and intensity of extreme

weather events, such as cyclones, floods, and droughts.

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Twelve ways to combat climate change

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THE theme for World Environment Day this year was "Your planet needs you- Unite to combat climate change". It reflects the urgency for nations to agree on a new deal at the crucial climate convention meeting in Copenhagen in December next.

We all know the planet is ours and we need to combat climate change together. Then how to combat? The UNEP has suggested 12 ways to do this.

• **Make a commitment** : Reducing the carbon footprint is no different from any other task. Only telling people to reduce carbon emissions may seem simplistic, but even simple actions like announcing a commitment to going carbon neutral can be effective, while the simple act of asking for ideas can lead to creative and innovative solutions. In recent months, several countries have indicated that they will go carbon neutral, led by Costa Rica, New

Zealand and Norway.

• **Assess where you stand**: It is likely that carbon will eventually be judged as an atmospheric pollutant and regulated accordingly, with consequent costs and opportunities for all sectors of society. Knowing where and how we generate greenhouse gases is the first step to reducing them. For individuals and small businesses, online calculators and internal assessments can help start the process. Larger organizations may need specialised advice and tools.

• **Decide and plan where you want to go** : Based on the assessment of climate-related risks and opportunities, a strategy and action plan can be developed. Targets help focused efforts and also provide a benchmark for measuring success. Most homes or businesses can reduce energy use by 10 per cent which almost always results in a 10 per cent reduction in greenhouse gas emissions.

• **De-carbon your life**: There is a broader way to think about carbon and climate. Everything an individual,

organization, business or government does or uses embodies some form of carbon, either in products themselves or in the energy and materials it takes to make them. Buildings, fittings and equipment are all proxies for carbon. Integrating climate friendly criteria into decision making can trigger a ripple effect.

• **Get energy efficient** : Improving the efficiency of our buildings, computers, cars etc. is the fastest and most lucrative way to save money, energy and carbon emission. While conventional buildings can account for almost 40 per cent of CO₂ emissions, high performance, environmentally accountable, energy efficient and productive facilities are now economically possible.

• **Switch to low carbon energy** : We can switch to energy sources that emit less carbon and can reduce costs and emissions. Since the lowest carbon energy source the hydro power generation -- has long-term negative impact and in here, we don't

have enough wind power, we can switch over largely to solar power that is very much available round the year in this tropical country. In many parts of the world customers can choose to have a percentage of their electricity supplied from a renewable energy source. These 'green choice' programmes are maturing and proving to be a powerful stimulus for growth in renewable energy supply.

• **Invest in offsets and cleaner alternatives** : There is a limit to how much efficiency we can squeeze from our lifestyle or our organization's operations, or how much renewable energy we can employ. The choice for those who wish to compensate for their remaining emissions is to fund an activity by another party that reduces emissions. This is commonly called a 'carbon offset' or 'carbon credit'.

• **Get efficient** : Looking at our life or business through a carbon neutral lens can help us in other ways by increasing the efficiency of resource use, avoiding and reducing waste

and ultimately improving the overall performance. After all, carbon is generally the waste product of producing energy, and reducing waste and becoming more efficient is always a good idea.

• **Offer or buy low carbon products and services** : The market for climate friendly products and services is growing rapidly, from energy efficient products to new renewable energy systems. To offer such products, however, it's important to begin at the design stage. Actions as simple as adding energy efficient specifications into the design process, for example, can produce a design that minimizes energy consumption during its use and saves customers the time and energy from making adjustments to a product after a purchase.

• **Buy green, sell green** : The market for green products and services is growing rapidly. In many countries consumer surveys report that growing numbers of consumers are willing to buy green products if given the choice. For businesses, innovative product

design and presentation combined with responsible marketing and communication can help ensure that this consumer interest translates into purchasing.

• **Team up** : Many private sector companies are increasingly working with non-governmental organizations, cities or governments to identify and implement best practice solutions to reduce emissions. The Carbon Disclosure Project, for example, is an independent non-profit organization providing information for institutional investors with a combined US\$41 trillion of assets under management.

• **Talk** : The increasing importance of climate change means that companies and organizations will need to communicate. Transparency is critical. The internet and other new media mean that companies, organizations and governments cannot hide behind green wash. This is where tools for verification and reporting guidelines with recognized indicators are critical.



In addition to all the above measures, we can follow UNEP's programme of planting seven billion trees worldwide. In Bangladesh, the tree plantation season has commenced and if every able citizen of this country plants

and nurtures a single sapling, we can have at least 100 million new trees to use carbon and emit oxygen!

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