WORLD YOUTH FORUM 2017
2° INTERNATIONAL CONFERENCE ON DELTA AND LAGOONS
EFFECTS OF CLIMATE CHANGE IN LITTORAL ZONES

At the headquarters of Ca' Vendramin Foundation, at the Land Reclamation Regional Museum, Taglio di Po (Rovigo), was held in the morning of 22nd September a Conference about the Effects of climate change in littoral zones.
The purpose to organize scientific meetings on the problems of the delta and the Mediterranean littoral wetlands is among the tasks that the Association of Mediterranean Deltas (Delta-med) given to itself. Deltamed is an association formed in 2002 at the "Institut Agroambiental Terres de l'Ebre", on the intent of the "Comunidad General de Regantes del Canal de Derecha de l'Ebre" and with Delta Po Adige Land Reclamation Board.
Deltamed associates legal entities representatives of delta and the Mediterranean littoral wetlands, in order to boost cultural exchanges and experiences on environmental issues of territory and on sustainable agriculture, such as mitigation actions against climate changes.
These, obviously, include the Ebro and Po Delta, to which were added over time the delta of the Rhone, Danube, Nile and the Evros, about the lagoons, those of Venice and Caorle. Recently joined other realities outside the Mediterranean area, such as "Mar del Plata" in Buenos Aires, in the delta of the Rio Paraná and the Mekong delta in Vietnam.

All the activities of the Conference, resumed in this document, are visible in their integrity by the following two links and below in the text, next to the name of the rapporteur, are indicated the times in which every individual intervention is recorded.
Link 1: first part https://www.youtube.com/watch?v=BSlWp-49nUA
Link 2: second part https://www.youtube.com/watch?v=9InYTZ8o1MI

The representatives of these realities have spoken at the Conference in the Ca' Vendramin Foundation, coordinated by **Eng. Lino Tosini** and opened by institutional welcome by the Presidents different Entities. First, **Dr. Dalle Vacche**, President of Pianura di Ferrara Land Reclamation Board, gave to the Forum the welcome also from DeltaMed President **Mr. Manuel Masiá**, who cannot been present to this occasion. Then, had follow the welcome of the Delta Po Reclamation Board President, **Adriano Tugnolo**, also the Mayor of Taglio di Po, **Dr. Siviero**, and by the General Director of ANBI, **Dr. Massimo Gargano** (7:30 link 1).
In greeting an audience that represents the culture of land conservation, "a decisive culture that moves uptime that exceed those of the political offices," the Director Gargano stressed all the ensuing consequences in terms of attention to emerging issues, "with culprit distractions" like those related to climate change, not warned in their well-known structure, with return periods of bad weather getting shorter, characterized by longer droughts periods, interrupted by violent storms like in tropical areas, with downpour and frequently with tragic floods.
Most qualified skills must take action to provide solutions that allow the best possible prevention and mitigation measures necessary to contain the serious damage caused by climate change.
Another major distraction denounced by time is that concerning the recovery of water resources by irrigation, which in Europe is perceived seriously only by Southern States.
"The water directive cannot be equal in Italy as in Northern Europe". It lacks the perception of a "water culture" that should be promoted in the community and in the political world and ANBI will begin by the end of September a tour in major Italian cities to promote a

better understanding of water economy, a sustainable economy focused to promotion of natural resources of the territories.

Before exposure relationships in the program, screened a movie made by Deltamed, directed of the Veneto Orientale Reclamation Board, on the current state of the coasts of the Adriatic, with simulated projections on rising sea levels and the possible consequences on the coastline, determined by climate change to 2050 and at the end of the current century (22:00 link 1).

The first speech saw the intervention of **Dr. Vanessa Cardin** (35:55 link 1) of the Oceanography and experimental Geophysics National Institute of the University of Trieste, who has focused to illustrate the role of the ocean in the origin of the now evident climate change. The ocean, which represents the largest global food reserve, also holds great resources that are out of balance in different parts of the globe.
Are changing especially the circulations of warm water in the deeper layers, which by the Gulf stream tend to feed the heat transfer northward and determine hot water exchanges between Equator and poles. The ice melting, evident in Greenland and in the polar ice caps, are the consequence of these transfers of heat in the ocean. In turn, studies of variations in different parts of the world distribution of photosynthetic pigments such as chlorophyll concentrations, they remark that they are minimal in ocean waters in Equatorial latitudes, in correspondence of the major deserts on the planet. Also confirm the increase of greenhouse gases, notably in carbon monoxide, critical to maintaining the atmosphere climate conditions suitable for life but that, beyond certain concentrations are the cause of global warming, highlights for several decades.
Since 1980 that is reducing the extent of glaciers, regularly monitored, as the Marmolada glacier in the Dolomites, which since 2002 has lost 10 cm per year. The imbalance phase is increased in the last 12 years because of anomalous frequency of drought and winter seasons with very little snow, less water in summer for irrigation and a greater frequency of extreme events, with flows turbulent weather like tornadoes or hurricanes.
The consequence of all this is the progressive, also if hardly perceptible, sea-level rise, scored an average of about 3 mm per year, but with different situations, for example, between the Black Sea and the Adriatic Sea that grows more, and between the open Gulf of Trieste and the lagoon of Venice, the 1960s saw a major rise, even to the phenomenon of subsidence, linked to industrial activities of Porto Marghera.
In Venice it is estimated that between 1978 and 2012 will be determined almost half a meter of sea level rise in the lagoon, with a serious increase in the phenomenon of high water between 2003 and 2013, in particular in the period 2010/2011, engraving on this development also by variation of wind regime, with the South wind that pushes water with greater frequency and intensity towards the lagoon and upstream, hampering the flow of rivers to sea and promoting river flooding inland areas more fragile, from the perspective of the hydraulic regime.

The report of the representative of the Institute of Oceanography of Trieste, was followed by the intervention of **prof. Luis Berga, University of Barcelona,** (57:00 link 1) which extended the analysis of the consequences of sea level rise to delta and at the coasts of the Mediterranean and other parts of the world.
Prof. Berga, one of the founders of Deltamed, first of all thanked the same Deltamed and Unesco for the support given to the Conference.
He reiterated that the origin of climate change there is the rise in temperature that, since 1920, is increased by 1.2°C, with 3-4 mm per year rise in sea levels. We know that the

volume of water increases with increasing temperature and the resulting is increase in sea level.
To mitigate this phenomenon, the world must reduce greenhouse gas emissions, an initiative that has been ratified with precise directions Paris agreements 2015. The increase in temperature on the planet must be contained within + 1.5°C below the actual +2° C that are determining the unbearable situation. It is necessary return to the levels of 20 years ago, by re-naturalize deltas, support the coasts with supply of sandy material and performing connected infrastructural green actions.
For the benefit of the coastline and delta, must also be reduced salinity and contained the phenomenon of subsidence, partly due to a natural sinking but also favored by human activities, which extracts gas from underground, using drilling that must be prevented or better regulated.
In the large delta of the world, such as the Nile delta del Po and Mecong, in Vietnam; involved 2.2 million hectares of fertile land and 145 million inhabitants.
The delta continues to expand, with the land of big rivers, but are very vulnerable and at risk of disappearing, with a rise in sea levels at a rate of 4 mm/year. For the Ebro delta is forecast to year 2050 +40 cm, which become +70/80 at 2100. Promotions currently determined to 15 cm from subsidence and other 25 cm above sea-level.

The intervention of prof. Berga, followed the report of the **Prof. Andrea Behar and Mgtr Tatiana Manotas Romero of the University of Buenos Aires**, (1:32:50 link 1) which is entertained in research on details of the Parana River problems at its river mouth and in the city of Buenos Aires, where 14 million inhabitants live with the nightmare of climate change watching the Atlantic Ocean push water toward the delta of Parana River and from the city downtown, with repeated phenomena of intense rainfall and strong winds from 60 to 90 km/h.
The intensity and frequency of these extraordinary rain are significantly increased in recent years and the city is not prepared to so intense rainfall. To identify possible solutions to avid downtown flooding, several initiatives are under way for the preparation of projects at different levels, national, regional, territorial and district with the involvement from the base of the resident population, for an integrated management of the situation.
With the big amount of sediments (about 1.600.000 Tons/year) carried downstream by the Rio Parana, delta continues to grow and is subjected to continuous mappings of the land, for the detection and monitoring of changes in the settlements of the population and prevent the risk of flooding. In the present state of things, the Downtown of Buenos Aires could be submerged in the 2200.

The following report saw the expected speech of **prof. Luigi Dalpaos of the University of Padua**, (0:00 link 2) the best-known expert in hydraulic engineering in Northern Italy, which dealt with the theme of the consequences of raising of sea on the Venice lagoon and bordering territories.
Projecting a cartography of Venice Gulf in the Northern Adriatic, pointed out that it is a low and Sandy coast, rich in coastal basins and valleys. Citing "Pliny the Elder" noted how in ancient times you could navigate from Grado to Ravenna passing through inland waters. Currently the areas behind the coast are below sea level and have been the subject of extensive integral reclamation to allow settling and land cultivation. He cited the eustasy and subsidence phenomena which, together with the anthropic action, have led to the current situation on the Adriatic coast. The mankind over the centuries has created defenses for its housing and productive purposes: the most significant example is the city of Venice.

The Venice lagoon, from the year 1000, underwent to the more important interventions, the diversions of rivers Sile, Piave and Livenza, by the Water Magistrate Authority (Magistrato alle Acque) to move eastward the mouths and prevent the burying of the northern part of lagoon, to get to the project of Mose to the present day.
In the Po delta the huge intervention around year 1600 on the Po di Tramontana, with the "cutting of Porto Viro" to allow the flow of water of the great river to the sea, prevented the burial of the southern part of the Venice lagoon and saw the birth of Taglio di Po, the city that is hosting us today. Since that time, in almost 400 years the Po delta advanced 25 km.
According to the evidence of the IPCC, the Intergovernmental Panel on climate change established in 1988 by the United Nations and UNESCO (Intergovernmental Panel on Climate Change) and to which was awarded the Nobel Prize in 2007 for the scientific value of studies and researches conducted, in evidence of rising made by sea from 1700 to the present day and the progress of climate change predicted between now and 2100, identified in a range between 50 cm and 1 meter the probable rise in sea level in the Northern Adriatic.
Considering this, the current conditions in the lagoon will change much. The lagoon is subject to great erosion and is reporting an advancement of water towards land in the South while in the North there is a reverse trend. The important Mose investment it was meant to defend Venice in the case of "high water" to a level of 110 cm, to assume a margin of 22 cm for future sea level rises, to protect the harbour activity of Venice and Chioggia.
These are the values determined in the study phase of 2000/2002, with a pessimistic view of about +31 cm sea rise, while the IPCC was already forecast to + 50 cm: a scale of downward in the planning stages hardly explainable that promote heavy doubts about Mose's ability to cope with situations that will appear on the Venice Lagoon.
The conditions of warming will affect sea level rise, if rising temperatures will be contained below 2° C or if they go over. An elevation ranges between 53 cm in 2050 and 2100 97 cm, is considered from the most authoritative scientists at the time, the most probable, even considering the margin of uncertainty affecting the ratings of these mathematical models.
In this regard, are still eloquent statistics those of the last 30 years on the lagoon tidal levels, with "level high water" (flood in Venice downtown) over 110 cm, measured at a Punta della Salute, with raising average of 16 cm (equivalent to 5,3 mm/year), that lead back to 53 cm rise for the year 2100.
Another significant confirmation of the precariousness of the situation take in account predicting the number of hours that the Mose should remain switched on to hold the 110 cm high water. Keeping in mind that the “high water phenomenon” has occurred with a frequency of 2 times per year from 1986 to 1995, and 8 times per year from 2006 to 2016, a sea level rise of 30 cm in 2100 would mean closing the inlets for at least 2000 hours (90 days), which would become the double (180 days) in case of an increase of 50/60 cm. This aspect must be considered also with all the environmental problems that would follow for the reduced water exchange to the lagoon.
The current draft of the MOSE seems to have a short life of operational efficiency (2/3 decades). Should therefore be considered other solutions to cope with sea level rises to + 90 cm, scheduled for the end of the century, continuously monitoring the effectiveness of current defenses (trapping rate or possible failures) and planning for time new solutions, with its funding, in order to make possible the salvation of Venice.

The report by prof. D'alpaos was followed from the intervention by the **consultant of Senegalese Associations in Italy, Dr. Stefania Girardi,** (25:00 link 2) to illustrate what is happening with the case of the Casamance River in Senegal. It goes inside for 300

km from the coast, with a troubling lifts of salt water, up to 200 km, which prevents the cultivation of rice and other crops grown in the area to feed the population. The situation has been helped by the significant reduction of rainfall, starting from the year 1970, passed from 1500 to 1080 mm, with a small recovering in recent years up to 1200 mm.
There are huge studying programs in order to get construction of dams that perform salinity stop and development of crops more resistant to soil salinity.

The situation in the populous coastal areas of Southeast Asia was then explained by **Prof. Massimo Sarti of the University of Ancona**, (43:00 link2) who has been working for years on these scenarios and in particular in the coast of Vietnam and the Mekong delta.
Were projected slides showing the vast lagoons within the Vietnamese coast, noting dangerous situations looming over the large population live on the coast and in the delta, under the threat of further rises in sea level. The Vietnamese coast, developed for 3200 km between the great delta of the Red River and Mekong, are very low with frequent internal lagoons, which host the main economic activities supporting the gross national product: fishing, fish farming and rice farming. The alert caused by the rising sea is implemented from 2007, with a climate that has resulted in a greater frequency of typhoons and other devastating weather turbulence that have already caused an 11% of people relocation.
FAO and World Bank are promoting projects for the safety of these heavily populated areas and exposed to these phenomena. There is also participation in FAO project in the Veneto region and the same Foundation Ca' Vendramin.

A particularly important case is finally that of the Nile delta, where the effects of climate change are affecting the availability of water for agricultural production, with the phenomena of salt intrusion and regression of freshwater in the delta, effectively presented by rapporteur **Dr. Badawi a. Tantawi**, expert of the **Field Crops Research Institute in Cairo** (1:07:30 link 2).
Research projects are being initiated to counter these phenomena, while they already have selected varieties of rice and other grains resistant to salinity in the soil.
For Egypt, this study concluded that a rising average sea level by 1 meter will affect about 10% of the total population, mostly located in the Nile Delta and nearly 12.5% of agricultural countries in terms of total agricultural area (20% of the total 35% of the agricultural population and size, respectively, with 5 m SLR). Therefore, for the region of the Middle East and North Africa, Egypt will be among the most affected countries.
The total population affected by SLR is estimated at 3.8 million for a SLR of 0.5 m, and 6.1 million for SLR of 1.0 m, respectively. For these 2 scenarios of SLR, the total crop land affected in this study was estimated at 1,800 km2 and 4,500 km2, respectively

The conclusions of the conference (1:28:30 link 2) were taken from the interventions of prof. Berga of the University of Barcelona, by Simone Grego, responsible for the UNESCO natural science sector in West Africa and Eng. Tosini, Coordinator of the Conference and representative of the Ca 'Vendramin Foundation.