THE PRESERVATION OF VENICE

By Sir Ashley Clarke

WE have most of us now forgotten that, in the small hours of 4th November, 1966, in the north of Italy, cities, villages and countryside were inundated to an extent which far exceeded anything in living memory. The damage in terms of human lives lost was fortunately relatively small; but in terms of damage to human habitations, to live-stock and above all to ancient monuments, libraries, archives and works of art it was appalling, particularly in Florence, but also in Venice.

In Florence the disaster was more dramatic than anywhere else and it was there, naturally, that the first main effort both of the Italian authorities and of foreign countries was concentrated. In this country, within less than a fortnight of the disaster, a body calling itself the Italian Art and Archives Rescue Fund had been formed and had sent its first aid in the shape of de-humidifiers, blotting paper, chemicals designed to cope with sodden books, and much besides. By Christmas the Fund had contributed Lire 100 million to the Mayor's International Fund and by the time it withdrew from Florence fourteen months later some £110,000 had been sent directly and an incalculable amount of expert help had been given, especially (but not exclusively) in setting the National Library on the way to recovery and in caring for sculpture of all kinds.

In Venice the situation was strangely different. It seems incredible now that the Venetians did not at once realize that a major disaster had struck their city since, as far as can be ascertained, it was the greatest flood disaster that it has ever experienced. But then floods of varying severity have been endemic from the very beginnings of Venice. It was not until two or three months later that, with an unprecedented rise in the humidity in walls everywhere, it was realized that, in comparison with the minor floods that are almost foreseeable and have been a regular feature of the autumn and winter for some time, this flood had been far worse.

I. The Church of the *Madonna dell'Orto*, Venice: St. Christopher (detail) before cleaning and restoration: note the arm wrongly replaced after some previous repair.

II. The Church of the *Madonna dell'Orto*, Venice: St. Christopher (detail) after cleaning and restoration.

The fate with which Venice has been faced more and more compellingly in the present century is one which has been latent since its earliest days. The very first settlers on the islands of the Venetian Lagoon and marshes came from near a similar lagoon fifty or sixty miles to the east as refugees from the hordes of Attila the Hun after the sack of Aquileia in A.D. 452. Refugees also came later from the other great cities of north-east Italy—Altinum, Padua, Vicenza and even Verona amongst them. Settlements were established at Heraclea, Torcello, Burano and Malamocco before they were established on the island of Rialto, later to be known as Venice.

Those early refugees found safety on the mud-banks of the shallow but fully tidal sea-lake and at first they regarded their abode there as temporary, pending the departure of the barbarians. But time went on and after the descent of the Longobards on this part of Italy a hundred years later, the settlers made up their minds that this lagoon was to be their permanent home. The wooden piles driven into the mud of the lagoon to prevent the tide from washing their islands away became the foundations of buildings in stone and brick and a living proof of that seemingly pessimistic French proverb that "il n'y a que le provisoire qui dure".

Exactly eleven hundred years elapsed between the election of the first Doge in A.D. 697 and the disappearance of the 120th and last in 1797, when Napoleon captured the city and the Republic of Venice ended. Clearly there is much in this long history on which we could dwell, notably the fact that out of these refugee settlements a major maritime and commercial power was born. Here it is only necessary, however, to note two things. The first is that from the earliest settlements onwards the Venetians have been fighting to control the sea, for fear that if they failed to do so it might at any time overwhelm them. The vigilance in this respect of the Republic under the Doges was exemplary. The Venetians do not look on the sea as an enemy, but rather as one of those large, over-friendly dogs which, with one devastating wag of their bushy tails, are capable of sweeping all last year's glassware off the work-bench.

The other historical point is that the fall of the Republic, the subjugation of Venice to Austria and the dismantling by Napoleon

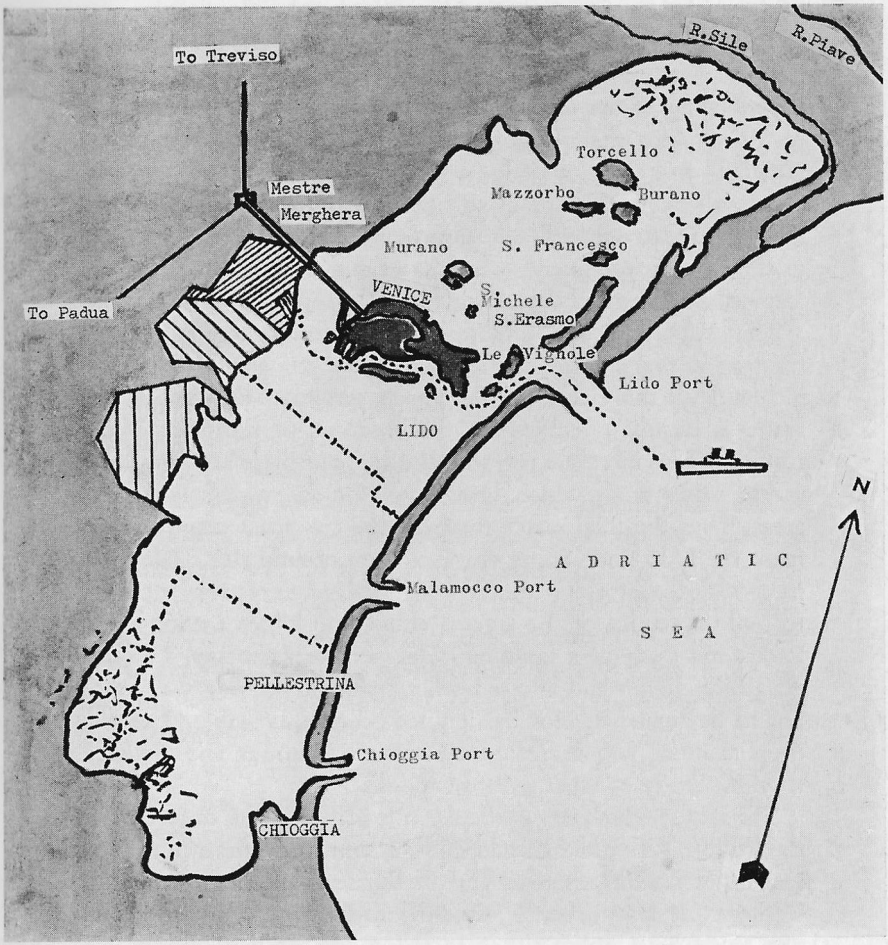
of the Doges' system of conservation marked the beginning of a much more serious phase in the decline of Venice, not only politically and sociologically, but also physically.

There is no one single problem in Venice that can be treated in isolation. Venice is notable for its unity. It has happened more than once that, in trying to remedy one defect, well-meaning people have created another. It is obvious, however, that the basic danger is that of being submerged. This was dramatically emphasized by the flood of 4th November, 1966, and in a lesser degree by serious floods on 5th November, 1967, and 3rd November, 1968. The so-called *acqua alta* (literally, high water) has now become only too familiar a feature of Venetian life.

The *acqua alta* is a relatively mild though disconcerting phenomenon. It is not an exceptionally high tide: it occurs when a normal high tide comes in on the top of water which is unusually high for other reasons. Exceptionally high tides do, of course, occur and some record has been kept of their recurrence since the year A.D. 589. Over the years since 1867, the first year after liberation from Austrian rule, the occasions when an exceptionally high tide has occurred have been recorded exactly. But even before that date we know that exceptional flooding occurred in 782, in 840, in 875, in 1102, in 1240 and so on. In the last hundred years, flood water at high tide has seldom exceeded 4 feet above normal. On 4th November, 1966, however, it reached 6 ft. 4 ins. above normal and the force of the water coming in from the sea kept it at this level for twenty hours.

The Venetian lagoon is some thirty-five miles long and its width varies between five and nine miles. Over much of its area its depth does not exceed two feet and, especially at both ends, there are marshy sandbanks, called *barene*, which appear or disappear according to the height of the tide. Much of the surrounding land is marshy too.

The accompanying rough diagram shows that the lagoon is protected by a narrow strip of land in which there are three gaps known respectively as the Lido Port, the Malamocco Port and the Chioggia Port. Of these the largest is the Lido Port which is to some extent guarded by the islands of St. Erasmo and Le Vignole. Large vessels enter the lagoon through this gap, pass to the south



Steamship route

"Watersheds" (spartiacque)

Causeway (railway and road)

Sandbanks (barene)

1st industrial zone

2nd industrial zone

3rd industrial zone (projected)

Venice and its Lagoon.

of these islands, enter the Giudecca Canal and make for the port of Venice at the western end of the city itself or for the industrial port of Marghera on the mainland. Lately work was begun on widening of the second gap, Malamocco, and the dredging of a new deep channel going straight across from there to the mainland and along the edge of the industrial zones to the port of Marghera. In the face of an outcry from Italia Nostra and all those who feared that these measures would upset the equilibrium of the lagoon waters and create an even greater risk of flooding Venice, work has for the moment been stopped.

The Adriatic is tidal and the sea therefore enters and leaves the lagoon twice every day through the three gaps. This tide is, incidentally, the city's only drainage system. The flow of the water is largely governed by the contours of the floor of the lagoon. These contours periodically shift but there are two, so to speak, water-sheds which broadly divide the waters into three areas. Thus the tidal water reaching the city itself comes chiefly from the Lido Port. Some years ago as a preliminary to devising methods of controlling the flow of tidal water, it was proposed to build a replica of the lagoon about one kilometre long near Padua and to make a series of studies and experiments. The land was duly chosen and allotted whereupon the money was found not to be available. Nor has it since become available. The new deep channel was therefore undertaken without any practical scientific study of what its effect would be.

The rate at which any particular tide brings a flow of water into the lagoon is irregular and depends, of course, on the atmospheric and other conditions over and in the sea and the surrounding territory. It also depends on astronomic conditions, the *acqua alta* tending to occur either at full moon or new moon. But broadly it can be said that there are four conditions peculiar to this part of the Adriatic which, if they were to operate at maximum intensity simultaneously, could even today practically submerge Venice under nine or ten feet of muddy, oily water. The conditions are first the tides, secondly the marine currents, thirdly the *sirocco*—a warm south wind which sometimes blows for three days on end, and fourthly the so-called 'seiches'. This last expression describes an oscillatory motion which occurs five or six times a year

from end to end of this narrow and relatively shallow sea: there are few places in the Adriatic where there is a depth of water of more than ten fathoms (60 feet).

On 4th November, 1966, a very strong *sirocco* had been blowing for more than forty-eight hours and driving the sea northwards. This time of year is a season of high tides, and simultaneously a storm over the mountains behind Venice was bringing an abnormal volume of water down the rivers into the Adriatic. These conflicting bodies of water met outside Venice and inevitably forced their way into the lagoon not only through the normal entrances but across the so-called *murazzi* or sea-walls built by the Doges. In many places the *murazzi* were breached. At the same time torrential rain beat down on the city, causing much damage to roofs.

It may be asked whether the unprecedented flood of 1966 followed by two more unusually severe floods on almost exactly the same day in the two following years were simply a freak or whether they can be related to a general deterioration of the situation in recent years. The answer is emphatically that there has been a definite and progressively rapid deterioration in the situation in this century. Out of 59 submersions of over $3\frac{1}{2}$ feet in the past hundred years, 49 have taken place in the past thirty-six years and 30 in the last ten. Furthermore, the times of year during which *acqua alta* occur have been lengthening and their frequency increasing, particularly since 1933.

There is no doubt that the whole of Venice and its lagoon are sinking in relation to the sea at a pace which is increasing every year. Venice, like London, is built on a cushion of water. When the first industrial zone was planned the intention—a highly praiseworthy one—was to bring a new economic means of livelihood to a city which was otherwise becoming no more than a large museum. Unfortunately, this plan meant draining the marshes and consolidating the *barene* which help to absorb superfluous water. Furthermore, the first zone was built very close to the lagoon, the second zone was built actually on the lagoon and the third, now planned, is also on the lagoon. Needing water, the designers of the new industrial plant, instead of piping it from the hills, drove wells

indiscriminately into the cushion of water which supports Venice. Even now this practice continues.

In addition, at the end of the SecondWorldWar methane gas was discovered under the territory adjoining Venice and, at a lower stratum, extraction has gone on without, it would seem, due regard for land subsidence. The sinking of the ground in Venice varies to some extent in relation to the weight which a particular area bears. In the past sixty years, for example, the façade of St. Mark's has sunk six inches and the foot of the Campanile over seven.

To land subsidence, excessive saline humidity and actual flood water a new threat to the stones of Venice has been added, namely the smog which blows across from the industrial zone charged with the fumes and exhalations of the factories there. These are principally concerned with iron and steel manufactures, chemicals, petro-chemical products, coking, glass-making and foodstuffs. It is not surprising therefore that the upsurge of interest in the fate of Venice caused by the 1966 disaster and, more especially, by the national and international efforts at restoration which followed it, has given rise to some gloomy predictions. Someone's guess of threescore years and ten as the city's present expectation of life recently made a headline in *The Times*; and only recently a picture of a gondola-hearse disappearing into the mists over the cemetery-island of San Michele with the title "There goes Venice!" brought up the rear of an otherwise highly intelligent and beautifully photographed B.B.C. documentary on this subject. The paradoxical truth is that this city, which has preserved more of the changing architecture of the past millennium than any other European city, has now perhaps a better chance of survival than it has had since the end of the 18th century.

Note the word 'perhaps'. Even so, this statement will sound paradoxical at a time when the threats to Venetian architecture, sculpture, painting, *intarsia*, frescoes and *intonaco* are demonstrably greater than ever; when the population has sunk to 120,000 (from 191,000 in 1951); and when habitable dwellings offering reasonable comfort to young people starting a career and a family are still diminishing. As already observed, all Venetian problems are inextricably bound up with one another. Yet the greatest enemy

of Venice in the past century and a half has been neglect, in contrast to the attention which its practical risks received in the Doges' time and in the palmy days of the *Magistratura alle Acque*. Now there is suddenly a new interest in these problems. Is it too late?

For any but the most casual visitor it would be difficult not to notice the hideous effects of damp rising every winter up the walls of churches and other public buildings and condensing on pillars and other interior stone surfaces. All over Venice marble is becoming diseased and turning to powder or becoming overlaid with sulphation. Nearly ninety per cent of the statuary in Venice either stands in exterior niches, as at Sta. Maria del Giglio, or in other ways forms part of the façades of churches as at S. Moisè. It is consequently very vulnerable to the combined effects of damp and the chemical action of fumes from Marghera and from the domestic use of fuel-oil.

One seriously stricken victim of all this is one of the loveliest of Venetian churches, Sta. Maria dei Miracoli, which is covered inside and out with marble of various colours. Here the most obvious problem is the cleaning, restoration and strengthening of the marble; but there is also the almost more fundamental problem of strengthening and perhaps rebuilding the brick core of the walls, which is deeply impregnated with salt and, being sandwiched between marble, cannot easily be drained. Furthermore, even to-day the experts have not found a reliable means of protecting and strengthening marble. Experiments are being carried out at Munich by Professor Lewin, at Padua by Professor Marchesini, at the Victoria and Albert Museum by Mr. Kenneth Hempel, and elsewhere by others. Though all can claim some progress in the last year or two, none has yet found an indisputable solution.

When, a few months after the 1966 disaster, the American (C.R.I.A.), British (I.A.A.R.F.) and German Funds were able, in conjunction with the capable, energetic and determined Dr. Francesco Valcanover, Superintendent of the Galleries, to get to work the Americans chose to concentrate their first efforts on the churches of S. *Zaccaria*, S. *Moisè*, SS. *Giovanni e Paolo* and S. *Sebastiano*, while the British chose the church of the *Madonna dell'Orto* and collaborated in creating the extensive painting restoration laboratory at *S. Gregorio*. It fell to one of the German

Funds to tackle the Church of the *Miracoli*. The Germans have begun well by putting in a damp course but the main problems still lie ahead.

At the *Madonna dell'Orto* (Jacopo Tintoretto's parish church in Cannaregio) and under the direction of the Superintendent of Monuments, Arch. R. Padoan, and his lieutenant, Arch. M. Bisà, joint British and Italian efforts have resulted in the complete rebuilding of the lower part of the fabric of the church and adjoining oratory, in some places up to a height of nine feet; the insertion of a damp course; the isolation of the marble floor by placing between it and the ground a layer of gravel, over that a layer of concrete and over that a bituminous material on which the marble now rests; the re-opening of the apse of the first chapel in the north aisle; the installation of a new electric lighting system; the complete renewal of the internal *intonaco;* and, perhaps most striking of all, the cleaning and restoration of the pictures. Among the eleven Tintorettos are the "Presentation of the Virgin" (over the door of the sacristy) and the two huge canvases in the sanctuary (54 ft. × 18 ft.) representing "The Worship of the Golden Calf" and "The Last Judgment", of which Ruskin wrote with such fervour in his *Stones of Venice*.

On the outside of the church there are some twenty-two statues. The two illustrations accompanying this paper show part of the St. Christopher before and after cleaning and restoration by the I.A.A.R.F. as an experiment to demonstrate that cleaning and repair were both necessary and beneficial.

The paintings by Tintoretto were restored in the new laboratory at *S. Gregorio*, the first laboratory ever to be created in the city of Venice capable of taking canvases of this size. Owing to the climatic conditions frescoes are rare in Venice: vast wall spaces were covered instead by oil paintings on canvas. At this moment the whole three-tier series of paintings in the church of S. *Zaccaria* are being restored at *S. Gregorio* under the famous Italian restorer, Signor Lazzarin, and the overall direction of Dr. Valcanover. Meanwhile, in the *Scuola di San Rocco* all the paintings there by Tintoretto are being restored, thanks to the American International Fund for Monuments.

This activity and much besides has helped to reinforce the

dedicated work of Italia Nostra's Venice section and has stimulated activity outside Venice and even outside the field of restoration. Venice has long been involved in a process of increasing isolation from its hinterland; and its importance as an administrative and regional centre is naturally affected by its lack of accessibility and the slowness of communications. A very serious study of the problems of Venice from this point of view has been made by a group of people headed by Senator Giusto Tolloy and a plan has emerged to create a system of rapid rail communications with the principal nearby cities in the province of Venice, the proposed terminals being Padua and Treviso. The trains would be electrified and roughly of the type on the London Underground, and the stretch of line to a few central points in Venice itself would pass under the lagoon. The idea is to provide the inhabitants of the whole area with frequent, rapid and easy communications to and from the city, thus bringing Venice once more into close contact with the surrounding provinces. Even Italia Nostra has given this proposal cautious support.

The grounds on which the plan is based are valid; but the results might be dangerous if tunnelling under the lagoon, particularly under the main island, were undertaken without very careful preparation and previous scientific enquiry into the possible disturbances to the floor of the lagoon. An experiment in the use of silent hovercraft is also likely in 1970. Since land, marsh and shallow water are all suitable for hovercraft, which need not follow a dredged channel and do not create a wake, it would seem that this form of transport might solve some of the problems of Venice and even fit in with the plans of the supporters of an underground.

Naturally, all the problems of Venice are in the first place a matter for the Venetians to solve and perhaps even more the Italian authorities in Rome. The subject has lately been very fully discussed in the Italian Parliament where it is hoped that a special law in aid of Venice may be passed before too long. The big inter-Ministerial Committee on Venice has now been provided with substantial funds and a far-reaching scientific enquiry has been launched under the aegis of the Council of National Research. But it would be idle to suppose that Italy alone can provide all the

means that will be required. It is encouraging that UNESCO's Campaign for Florence and Venice is beginning to take practical shape and to be in a position, on a larger scale, to carry on when the foreign Funds, such as I.A.A.R.F. and C.R.I.A., which bore the brunt of the immediate aftermath of 1966, are shortly now wound up. With UNESCO funds a comprehensive study has already been made of the monuments and works of art in need of rescue action, and two separate international advisory committees have been set up and in July, 1969, held their first meetings.

UNESCO has also sponsored in Italy the publication of *Rapporto su Venezia* (Report on Venice), which is shortly also to appear in France and the United Kingdom. This admirable review of the whole range of the problems of Venice is largely the work of Monsieur L. J. Rollet-Andriane, UNESCO's representative in Rome. Like all "occasional" books it has some *lacunae*, more especially in the concluding passages, which appear to emanate from another hand, but taken all in all the book furnishes most valuable pointers to the areas where action is needed and can most usefully be directed. It will serve the purposes not only of UNESCO itself but also those of other international organizations, such as Europa Nostra and the European Cultural Foundation of Amsterdam, as well as any national committees that may hereafter be set up by those in foreign countries who wish to keep Venice from sinking beneath the waves. So 'perhaps' she will survive.