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Doctor of Rivers
On the Remedies for Facing the Fortune in the Italian Renaissance

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Doctor of Rivers

On the Remedies for Facing the Fortune in the Italian Renaissance

Simone Mammola

Renaissance medicine had the peculiar capacity to integrate in an organic and functional weave even historical and antiquarian competencies next to those properly naturalistic and biological. This is mirrored by the widespread use of medical metaphors in the context of moral and political, civil and technical reflexions. Such is the case also for the management of waters and rivers. So while Agostino Bacci compares floods to a disease and the idraulic engineer to a physician who, unable to alter upstream the course of things, prepares valid defensive strategies, Machiavelli gives literary dignity to the description of fortune like a river in flood that threatens to overwhelm and destroy everything.

Their common recognition of a connection between the works of hydraulic engineering and the complex relationship between power and human freedom, on the one hand, and, on the other hand, luck or necessity, can be set, as we shall show, in the perspective of a new ideal of science, for which the profile of Bacci's "doctor of the river" partly overlaps with Machiavelli's virtuoso *— a science that places in the middle of its investigation a critical survey of experience, and that is partly inspired by a certain way of doing medicine, partly by a certain way to read the history, and that focuses on the complexity of a world, natural as social, which rebels against too rigid schematizations.*

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Torrente, qui imbri excreverat, maxima vis
lignorum volvebatur, inter quae una arbos, reliquis
amplior, quod a se complura arbusta ita adhaesissent,
ut ob id et sistere loco iniquo et omnem impetum
excrescentis aquae sola substinere cogeretur: "Quam est"
inquit "res molesta amplitudo!". Respondere arbusta:
"Tu quidem, quae aureos soles et candidissimas nobis
horas complures tua umbra intercepisti, ferre aequo animo
debes si, turbatis rebus, paulum in te conquiescimus"
(L. B. Alberti, *Apologi*, LXXXIV)[1].

Among the many points of interest abundantly scattered in the last great work of Nancy Siraisi, the chapter devoted to what the author herself has called the "battle of the books over the Tiber potability of water" arouse particular attention (Siraisi 2007, 168-93). This story, which involved some physicians working in Rome in the second half of the 16th century, is indeed symptomatic of the public and political vocation that often characterizes a branch of knowledge such as medicine, but above all of the peculiar capacity that it had, in its Renaissance variant, to integrate in an organic and functional weave even historical and antiquarian competencies next to those properly naturalistic and biological which habitually fall into its background. In some cases these interventions were the development of real technical surveys required by a Curia which was very active in the field of urban policies.

This is for example the case of Andrea Bacci (1524-1600), whose work *Del Tevere* (On Tiber), published for the first time in 1558 in two books, increased in 1576 of a third book devoted specifically to the flooding of the river, in which he incorporated his experience gained as a member of a special board instituted by Pius V at the beginning of his pontificate to deal with just such a problem

[1] Alberti 1989, 98. ("A big mass of wood turned in a creek swollen by the rains. Among it there was a tree, more massive than the others, to which several bushes clinged. Thus the tree not only was forced in an ungrateful place, but it also had to carry the impetus of the waters alone. 'What torment is greatness!', it said. And the bushes replied: 'You, who with your shadow deprived us of the golden sun and the brightest hours, accept now patiently that we rest a bit against you, in this tumultuous situation'").

(Siraisi 2007, 179)[1]. Siraisi has rightly noticed that, even while facing issues that are mostly engineering, Bacci continues to think as a physician and to employ a lexicon, and especially a method, that is inherited from his profession. To illustrate this, she has reported a passage that well summarizes the overall approach of Bacci to the question:

> we conclude and hold for a maxim that it is impossible completely to eliminate [floods]… However, it is necessary to proceed in the manner of a good physician who uses great care to find out all the causes of the disease and the appropriate remedies; and with all this, in the cure the most important thing to which he holds is experience. (Siraisi 2007, 180, modif.)[2].

Doing so, however, the simile is cut off in half. If we go beyond the frame of this quote, we read further:

> and where he [*sc.* the physician] is not able to apprehend the immediate causes and to the roots of the evil, he works on the outer parts, with diversions and precautions, and other good warnings, which in most cases are enough to defend oneself. And I believe that we must do the same with this ancient and so dangerous illness of Rome, that is,

[1] "In the beginning of the Pontificate of Pius V, when His Holiness, desirous of the common health and particularly of the good of this great City, promulgated a public edict to arouse the ingenious minds to this healthy task, namely to remedy the flooding of the Tiber, I found myself in some councils, which were held for that reason in the presence of the most Celebrated and most Reverend Cardinals Sforza and Montepulciano, and of the 'Magistrates of the Roads', where, among many noble architects, engineers and other men of value in different professions, I heard a great diversity of opinions around this flood and its remedies" ("Nel principio del Pontificato di Pio V, che sua Santità desiderosa della commune salute, et del bene particolarmente di questa alma Città, mandò un editto publico, ad eccitar gli animi ingegnosi a questa salutifera impresa, di rimediare alle inondationi del Tevere, io mi ritrovai in alcune consulte, che perciò si fecero innanzi alli Illustrissimi, et Reverendissimi Cardinali Sforza, et Montepolciano, et li Signori Mastri di strada, dove, tra molti nobili architettori, et ingegnieri, et altri huomini di valore in diverse professioni, io intesi una gran diversità di pareri intorno a questa inondatione, et a suoi rimedii"; Bacci 1576, 269). The "Maestri di strada" here mentioned were magistrates responsible for the regulation and maintenance of roads, bridges and water (cf. Verdi 1997). Bacci would later published yet a fourth book on inundations, separately, after the new flood of 1598 (Bacci 1599). About this subject, see also Long 2008.

[2] "Però ritorniamo a concludere, et tener per una Massima, che sia impossibile a potervi totalmente rimediare (…). Et però si conviene di fare a guisa del buon medico, il quale usa ben diligenza di ritrovar tutte le cause della malattia, et li rimedii appropriati; con tutto questo nella cura s'attiene più all'esperienza" (Bacci 1576, 288-289).

we cannot do anything else but defend ourselves by the use of common remedies. (Bacci 1576, 289)[1].

Therefore, if the flood appears as a disease, whose remote causes are partly inscrutable, partly uncontrollable anyway, the engineer in charge of water control will be consequently comparable to a physician who, unable to alter upstream the course of things—that is to prevent systematically the getting sick of men—, strives however to prepare some valid defensive strategies to contain the action of evil when it comes into view with its traits of novelty and unpredictability. Metaphors aside, most of his work will be to dampen the impetus of the overflow, hold it and weaken it, so as to prevent it overwhelms the city with all its force and produces death and destruction to the urban population. Significantly, Bacci presents also the debate that took place within the board of Pius V on possible practical solutions to be adopted to achieve these goals, using phrasings and patterns of thought that are exactly the same as those used in the contemporary debates among physicians, in particular with regard to the relationship between "method" and "experience" and the way forward when you do not know in depth the causes of pathological events:

There was very little conviction among them all with regard to the causes, which was to be the main purpose; both since ancient writers, as we have widely shown, hardly provide a cause of floods, and because most of the discussants, putting science aside, talked about it without method, and, in the manner of the empirics, paid attention only to the remedies; so that, not knowing well (as it were) the causes of the disease, we also could not resolutely deal with the remedies. Someone proposed some remedy already tried by the Ancients, but, even if they knew how many different efforts the Ancients had put in such cares, they showed nevertheless not to perceive the difficulties that the Ancients themselves had met therein. Some others made impossible schemes, and some out of place; and others kept some of their projects a secret. (Bacci 1576, 269-70)[2].

[1] "Et dove non gli è concesso arrivare alle cause immediate, et alle radici del male, opera nelle parti di fuori, con diversivi, et con difensivi, et altri buoni avvertimenti, che per lo più bastano a difendersi. Et così credo io, che debbiamo far noi in questa antica, et così pericolosa infermità di Roma, cioè, che non possiamo far altro, che difenderci con li rimedii communi".

[2] "Pochissima risolutione s'udì fra tutti quanto alle cause, che dovea esser lo scopo principale; sì perchè da gli scrittori antichi difficilmente si causano, sì come noi distesamente habbiam mostrato, sì perchè la maggior parte, lasciando le scienze da banda, ne ragionavano senza methodo, et, a uso

Within this discussion, the request raised by Bacci for using the "common remedies" materialize in a prudent imitation of the solutions already adopted by the ancient Romans, though far more attentive to the relative difficulties than were the advices given by superficial antiquarians remembered in the passage just quoted. We shall see later which literary form Bacci will give to his proposal. For now we see that the invitation to look to the Romans rests essentially on the assumption that these people, perfectly aware of a problem that was for them a matter of life or death, do not skimp efforts to face it, and that nobody ever knew of others that, from then on, have devised more effective strategies than those already developed by them: and if Bramante or Michelangelo, too, explicitly mentioned by Bacci as examples of contemporary "miraculous" architects, have not been able of this, there is reason to believe that perhaps extraordinary solutions—some "secrets" as much miraculous—are not available here, beyond the fantasies of some charlatan[1]. But since the Ancients, in spite of all their wisdom, only managed to contain floods, limiting their damage but never preventing it altogether, it is likely that even the Moderns must resign themselves to this not fully conclusive outcome. What they can do, however, is not little:

From this we deduce as a Maxim concerning the remedies of this flood, that what those Ancients, who were so powerful, did not do, we must not even dare make it, and that therefore this is an impossibile or very difficult task. Nevertheless, if you distinguish carefully between the causes that must be taken into account in such an enterprise, there are some means of success. Because it is true that this flood has causes, and it is impossible that they can be otherwise; therefore we properly call them "necessary causes"—that is, causes that are not in our power, but of nature alone, as the water that comes down in rain, the sea that hampers it, the wind that tucks in the river, and the shallowness of the site, all things which, either we like it or not, will inevitabily do their effect. But, since

degli empirici, havevan riguardo solamente a rimedii; a tale, che, non sapendo bene (come dir) le cause del male, manco si poteva risolutamente trattar de i rimedii. Alcuni proponevano qualche rimedio, tentato già da gli antichi; ma costoro, avvenga che sapessero in quanti modi gli antichi s'affaticassero in questa cura, mostravano con tutto ciò haver poco avvertito alle difficoltà, ch'eglino all'incontro ci hebbero. Altri davano nell'impossibile, et tal'uno senza proposito; et altri tenevano certi loro disegni per secreti". The contrast between "methodici" and "empirici" runs through most of the 16th-century medical literature; for a discussion of the issue, cf. Mammola 2012, 154-214.

[1] Cfr. Bacci 1576, 289-90.

the floods can be higher or lower, as we also have said, according to the combination of many other accidental causes which are partly in our power—as the impediments of the course of the river, the filling and the narrowness of its bed, the scarce space, which requires some venting elsewhere, and the meeting of many rivers together—to them those Ancients turned all their care. That is, not being in their power to get rid completely of the floods, they deemed it important to be able to hold and moderate them, as Cornelius Tacitus said of Tiberius *Ad moderandas Tiberis inundantiones*, and before him Suetonius of Augustus *Ad coercendas exundationes*. And as they paid attention, in different times, to one cause or to another, they protected quite well Rome against this great danger, as we could also do, imitating their example. (Bacci 1576, 266-7)[1].

There is therefore a constant dialectic between "necessary causes", which "are not in our power, but only of nature", and "accidental causes", "which are partly in our power"—and it is precisely only to the latters which the care of the engineer must be turned, as well as that of the physician, in their respective fields of expertise. This partition is not perfectly fair (even the accidental causes are in fact only "partly" controllable), however, it identifies a space of real action for human intervention, which, though limited, can be extremely effective and in many cases also decisive for the purposes of public health (this is often "enough to defend themselves", Bacci says). From the point of view of

[1] "Dal che si cava un argomento, et una proposition Massima intorno alli rimedii di questa inondatione, che, quel che non fecero quegli antichi tanto possenti, manco debbiamo ardir noi di poterlo fare, et che però questa sia impresa impossibile, o difficilissima. Con tutto ciò, se si farà distintione delle cause, alle quali si deve haver rispetto in così fatta impresa, non mancano delle vie possibile a ripararvi. Perchè vero è, che questa inondatione ha delle cause, le quali è impossibile, che possino esser altrimenti, che però chiamiamo a suo luogo cause necessarie, cioè che non sono in poter nostro, ma della natura sola, come l'acqua, che piove, il mare, che ritiene, il vento, che rimbocca 'l fiume, et la bassezza del sito, le quali, o noi vogliamo o no, è forza, che faccino l'effetto loro. Ma, perchè le inondationi si fanno maggiori, o minori, come pure habbiamo detto, secondo 'l concorso di molte altre cause accidentali, le quali sono in parte in poter nostro, come sono l'impedimento del corso del fiume, il ripieno, la strettezza del letto, il poco spatio, che ha da sfogar per altrove, et il concorso di più fiumi insieme; a queste si volse tutta la cura di quegli antichi, cioè, che, non essendo in poter loro toglier l'inondationi affatto, assai parve a ritenerle, e moderarle, come usò di dire Cornelio Tacito in Tiberio, *Ad moderandas Tiberis inundationes*, e Svetonio prima in Augusto, *Ad coercendas exundationes*. Et, secondo, che in varii tempi s'hebbe rispetto quando ad una, et quando ad un'altra causa, fecero in modo, che assicurorono Roma non poco da un tanto pericolo, come anco potremo far noi, imitando le vestigie loro". Bacci here allude to Tacitus, *Annales*, I, 79, and Suetonius, *Vita Divi Augusti*, 30, but in his quotes he inverts "inundationes" and "exundationes".

the final outcome, in fact, that the levees withstand perfectly or that the flood will not occur at all, is exactly the same thing, as well as, in the case of illness, not contracting it at all or being healed smoothly: the difference lies only in the technical intervention and the commitment (theoretical, economic, temporal, etc.) that it demands. But then, what we find in the work of Bacci is a possible and technically well-defined variation of a myth that exerted strong pressure on the unconscious of some great Renaissance personality committed to redefine the terms of ancestral struggle between virtue and fortune, freedom and necessity, order and chaos.

1 Of course, the thought immediately goes to Machiavelli. Indeed, it is he who in a beautiful page of the *Prince* gave high literary dignity to the description of fortune like a river in flood that threatens to overwhelm and destroy everything. Machiavelli had already used a similar image in some verses of his *Capitolo di Fortuna*, where it is particularly accentuated the catastrophic and almost fatal nature of the overflow, which seems to leave no escape for anyone who is on its way:

As a rapid stream, which in all
is made proud, shatters everything
and everywhere pushes its course in every part;
and raises this part and increases and that,
moves its shores, changes its bed and its bottom,
and the earth quakes where it passes;
so Fortune, with its furious
impetus, many times, now here and now there,
is transmuting the things of the world[1].

[1] "Come un torrente rapido, ch'al tutto | superbo è fatto, ogni cosa fracassa | dovunque aggiugne il

Compared to these tercets, the intonation of the *Prince* is different. Although Machiavelli does not deny the impression that, at first sight at least, "wordly things are so Governed by fortune and by God, that men can not correct them with their prudence, indeed that they have no remedy at all", he immediately adds, with one of the most famous "nonetheless (*nondimanco*)" of all Italian literature, that though "fortune is arbiter of half of our actions", however "she leaves the other half, or close to it, for us to govern" (where, like Bacci, he shows a certain caution in considering perfectly equivalent opposing forces of the luck and human virtue: we do not know if Bacci had memory of this Machiavellian passage, but this common caveat is worthy of note). It is clear that here the flood is not longer evoked to arouse a kind of panic terror for the unavoidability of a destiny that plays with the lives of the men, but on the contrary to emphasize that, although the fight is tough, the man has got some strings to his bow (to use another image dear to Machiavelli):

> And I liken her [*sc.* the fortune] to one of these violent rivers which, when they become enraged, flood the plains, ruin the trees and the buildings, lift earth from this part, drop in another; each person flees before them, everyone yields to their impetus without being able to hinder them in any regard. And although they are like this, it is not as if men, when times are quiet, could not provide for them with dikes and dams so that when they rise later, either they go by a canal or their impetus is neither so wanton nor so damaging. It happens similarly with fortune, which demonstrates her power where virtue has not been put in order to resist her and therefore turns her impetus where she knows that dams and dikes have not been made to contain her. (Machiavelli 1985, 98-99)[1].

suo corso per tutto; | e questa parte accresce e quella abbassa, | varia le ripe, varia il letto e 'l fondo, | e fa tremar la terra donde passa; | così Fortuna, col suo furibondo | impeto, molte volte or qui or quivi | va tramutando le cose del mondo" (Machiavelli 1971, 979).

[1] "(…) le cose del mondo sieno in modo governate dalla fortuna e da Dio, che gli uomini con la prudenza loro non possino correggerle, anzi non vi abbino remedio alcuno"; "(…) la fortuna sia arbitra della metà delle azioni nostre, ma che etiam lei ne lasci governare l'altra metà, o presso, a noi"; "E assomiglio quella a uno di questi fiumi rovinosi, che, quando s'adirano allagano e' piani, ruinano gli alberi e gli edifizii, lievono da questa parte terreno, pongono da quella altra; ciascuno fugge loro dinanzi, ognuno cede allo impeto loro sanza potervi in alcuna parte obstare. E benché sieno così fatti, non resta però che gli uomini, quando sono tempi queti, non vi potessino fare provvedimenti, e con ripari e argini, in modo che, crescendo poi, o egli andrebbano per uno canale, o l'impeto loro non sarebbe né sì licenzioso né sì dannoso. Similmente interviene della fortuna; la

There is no doubt that the fury of the waters was a particularly perceived problem at that time, since the frequency and violence of the floods were a looming threat to the inhabitants of cities like Florence or Rome (the *Diario Fiorentino* of the apothecary Luca Landucci records for example that the Arno "became big (*venne grosso*)" or "very big (*molto grosso*)" eight times between 1465 and 1515, causing "great losses (*gran danno*)" to people, animals and buildings)[1]. To get an idea of this we can read the vivid story of the extraordinary flooding of the Tiber in 1557 that Bacci himself has left us, as an eyewitness:

The Nera grew up extremely at Terni and Narni, and grew even those little rivulets which under Civita Castellana are combined with the Tiber, and among all gathered eventually so great overflow that the Tiber, extended along the plain of Monteritondo like a raging sea, came to finding Rome. Where, as there was two or three days before an ordinary rain, and on that day, which was 14 September, weather was almost serene, it saw immediately the Tiber increase and, a little later, not without surprise, apparently almost come back, repulsed from the sea. First the Tiber began to emerge from the sewer, and afterwards by the full of river it start to overflow and course through all the streets so furiously that in a very few hours made navigable the most part of Rome. Really terrible and miserable spectacle to see a city so great almost submerged in a sea, and everything in great confusion swimming, and wares and things to live and merchandises and entire herds! Not to mention the several accidents of the people: some, caught suddenly, took refuge in a tree; some others found themselves besieged in a shack in the country, with evident danger or of destruction, or of starvation; and some others, secured too, with boats tried to save themselves through the windows, or waited someone who with a pike gave them some bread; and many catched under the ruins or drowned or died in different ways, not otherwise than you see or imagine whichever great shipwreck at sea. (Bacci 1576, 254-55)[2].

quale dimostra la sua potenzia dove non è ordinata virtù a resisterle; e quivi volta li sua impeti dove la sa che non sono fatti gli argini e li ripari a tenerla" (Machiavelli 1971, 295).

[1] Cfr. Landucci 1883, 5, 30, 61, 69, 188, 215, 288, 360. About the social perception of floods and other natural disasters from the late Middle Ages till the 16th century see Matheus 2010.

[2] "Crebbe la Nera a Terni, et a Narni estremamente; et quei piccoli fiumicelli, che sotto Civita castellana si giungono co 'l Tevere, crebbero, et fra tutti si raccolse alla fine sì gran piena, che distesosi 'l Tevere per li piani di Monteritondo a guisa d'un impetuoso mare, venne a trovar Roma. Dove essendo stata due o tre dì prima una pioggia ordinaria, e in quel dì, che fu 'l quattordici di Settembre, tempo quasi sereno, si vidde in un subbito ingrossare 'l Tevere, et da ivi a poco, non

After noting the exceptional nature of the phenomenon, Bacci adds, combining sense of public good and clinical eye, that the detrimental effects of flooding persist over time and can even lead to a complete abandon of a whole country:

And there it should be take action, all the more that in such cases it is up to each one the same luck, and above all by Princes, which, in addition to personal dangers, have to fear the universal damage of the entire Republic. If only because of the ruins of bridges, edifices and farms, not only dismantled, but destroyed, and some stripped of trees up from the roots, and the consumption of food and the floods, which leave then a mud and an infinite slime everywhere, which, because (unlike the other rivers) is nothing but clay and sand, make poor the land and dry the screws; and since it takes months and years to remove himself, it cause a extraordinary moisture and catarrhs and cold pains, dangers really suitable to make unpopulated throughout a country. (Bacci 1576, 255)[1].

No wonder then if the image of the flood produced by a rushing river that disrupts the natural and social world is regarded as particularly appropriate to represent the action of fortune, nature or necessity in human affairs, almost to offer an even more dramatic depiction of the ancient wheel of fortune which once lowers what was up, once elevates what was down, according to his inscrutable plan. All the unleashed forces of nature seem here to crush men and nail them to a fate of continuous insecurity, which recalls the atavistic terror

senza maraviglia, che parea quasi ritornare indietro, rincalzato dal mare, cominciò prima ad uscire dalle chiaviche, et appresso dal pieno del fiume a traboccare, et scorrer sì furiosamente per tutte le strade, che in pochissime hore fece la più parte di Roma, navigabile. Spaventevole veramente, et miserabile spettacolo a veder sommersa una tanta città quasi in un mare, et in gran confusione andare ogni cosa a nuoto, et robbe, et cose da vivere, et mercantie, et gli armenti interi. Senza dir di diversi accidenti di persone, che altri colti all'improvviso, si ricoverorno in un arbore, altri si trovorono assediati in una casipula di villa, con pericolo evidente o di rovina, o di morir di fame; et altri, che, assicuratisi troppo, tentavano con barche salvarsi per le finestre, o aspettar, chi per una picca porgesse loro del pane; et di tanti colti sotto le rovine, o annegati, o morti in diverse maniere, non altrimenti, ch'a vedere, o imagnarsi un qual si vogli gran naufragio di mare".

[1] "Et maggiormente vi si deve provedere, quanto in sì fatti casi ogn'uno corre una medesima fortuna, et i Principi maggiormente, li quali, oltra alli proprii pericoli, hanno da temere del danno universale di tutta la Republica. Non fosse altro, che le rovine de' ponti, d'edificii, et di possessioni non solo smantellate, ma destrutte, et spogliate tal'una d'arbori fin dalle radici, et il consumamento de' viveri, et le piene, che lassan poi un fango, et una melma infinita per tutto, la quale perchè (a contrario de gli altri fiumi) non è se non creta, e reniccio, smagisce li terreni, et secca le viti; et perchè dura poi li mesi, et gli anni a sgombrarsi, viene a causare una humidità straordinaria, et catarri, et doglie frigide, pericoli veramente atti a far dishabitare tutto un paese".

of the Deluge[1]. The concrete and tremendous aspect of this danger, however, allows us to better appreciate the value of a resistance that, by not giving in to despair, employs the intelligence to hold it in every way.

It may be instructive in this regard a comparison with another quote from Machiavelli, the description (in the *Florentine Histories*, VI, 34) of the tornado that devastated the Tuscan countryside in 1456, a so powerful storm that anyone who heard the noise thought that "the end of the world had arrived, that the earth, waters, heavens, and entire universe, mingling together, were being resolved into their ancient chaos" (Machiavelli 1901, 303)[2]. Also here we are therefore in the presence of an event by the cataclysmic contours. In effect, after this windstorm, "the country had lost all its habitable character; churches

[1] Machiavelli considers the "inundation of waters" ("inondazione d'acque") as the most important phenomenon, worse than the hunger or the plague, between those that "eliminate the humane race and reduce the inhabitants of part of the world to a few" ("spengono la umana generazione, e riducano a pochi gli abitatori di parte del mondo"). Remixing excerpts from Platonists and Aristotelians, as well as Biblical passages, he recalls the idea of cyclic deluges that kill everyone except the men more rude who live on mountains, from which slowly the path of civilization restart. Rather than dismiss these theories as mythical, Machiavelli believed that was reasonably established on physiological basis, revaeling one more time a peculiar sensitivity to medical categories: "for as in simple bodies, when very much superfluous matter has gathered together there, nature many times moves by itself and produces a purge that is the health of that body, so it happens in this mixed body of the human race that when all provinces are filled with inhabitants (so that they can neither live there nor go elsewhere since all places are occupied and filled) and human astuteness and malignity have gone as far as they can go, the world must of necessity be purged by one of the three modes, so that men, through having become few and beaten, may live more advantageously and become better" ("perchè la natura, come ne' corpi semplici, quando e' vi è ragunato assai materia superflua, muove per se medesima molte volte, e fa una purgazione, la quale è salute di quel corpo; così interviene in questo corpo misto della umana generazione, che, quando tutte le provincie sono ripiene di abitatori, in modo che non possono vivervi, né possono andare altrove, per essere occupati e ripieni tutti i luoghi; e quando la astuzia e la malignità umana è venuta dove la può venire, conviene di necessità che il mondo si purghi per uno de' tre modi; acciocché gli uomini, sendo divenuti pochi e battuti, vivino più comodamente, e diventino migliori" (*Discorsi*, II, 5; Machiavelli 1996, 139-40; Machiavelli 1971, 154-5). Bacci also has a similar thinking. He exposes indeed that Ancient do not gave any reason of the floods, although they "are one of first causes that ruin the world, and submerge provinces and entire cities, with an inestimable destruction of peoples" ("sono una delle prime cause, che rovinano il mondo, e sommergono le provincie, e le città intere, con distruttione de' popoli inestimabile"; Bacci 1576, prefacy [3]). On theory of deluges in Aristotle, cf. Chroust 1973.

[2] "(…) il fine del mondo fusse venuto, e la terra, l'acqua e il resto del cielo e del mondo, nello antico caos, mescolandosi insieme, ritornassero" (Machiavelli 1971, 789).

and dwellings were laid in heaps; nothing was heard but the lamentations of those whose possessions had perished, or whose cattle or friends were buried beneath the ruins; and all who witnessed the scene were filled with anguish or compassion" (*ibidem*)[1]. It was, indeed, an event so shocking and unexpected that even a man disenchanted such as Machiavelli records the perception of a possible supernatural causation, especially because the storm upset mysteriously only the countryland, but it spared the city, and this fact could appear almost as a sign of a divine warning, as an ultimatum calling for the conversion of Florentines. If the whirlwind had bent toward Florence, "filled with houses and inhabitants, instead of proceeding among oaks and elms, or small and thinly scattered dwellings, it would have been such a scourge as the mind, with all its ideas of horror could not have conceived" (*ibidem*)[2]. In the face of phenomena like these, it seems that you can not do anything but surrender or escape: if therefore the fortune presented only this aspect, the man could hardly resist its shots. The flood is different. If its effects are potentially catastrophic exactly as those of the tornado just now described (you can compare this account of Machiavelli with that of Bacci quoted before), in this case, however, "it is not as if men, when times are quiet, could not provide for them with dikes and dams" (Bacci would say: "there are some ways of escape"). It is possible, that is, to prepare some containment strategies that allow us if nothing else to limit the damages, and in the best case even to avoid them. The margins are tight, but walkable: civil engineering thus becomes a source of inspiration for a realistic humanism that does not aspire to change radically the order of the world, but to live with it in the safest way possible.

[1] "Vedevasi il paese desolato e guasto; vedevasi la rovina delle case e de' templi; sentivasi i lamenti di quelli che vedevano le loro possessioni distrutte, e sotto le rovine avevano lasciato il loro bestiame e i loro parenti morti: la qual cosa a chi vedeva e udiva recava compassione e spavento grandissimo" (*ibidem*).

[2] "(…) infra le case e gli abitatori assai e spessi, come l'entrò fra querce e arbori e case poche e rare, sanza dubio faceva quella rovina e fragello che si può con la mente conietturare maggiore" (*ibidem*).

2 Obviously, Machiavelli is reasoning about necessity and free will, in a political context in which his thought is engrossed by his poor Italy exposed to violent struggles between the foreign powers, as "a country without dams and without any dike" (Machiavelli 1985, 99)[1]—and its metaphor is just a metaphor. But we must not think that he did not know what he was talking about. In the Renaissance, water management in its various forms constituted one of the main chapters investment by the princes and States, as well as an important test bench for engineers and architects continually struggling with projects of canalization, drainage, irrigation, building of bridges or fountains, and water supply. Even in the military field, but without much luck, it was attempted to take advantage of the rivers as weapons in case of siege, diverting their course to prevent the besieged from access to water (such as in an episode of the war of Florence against Pisa which involved as a supervisor Machiavelli himself and perhaps as a consultant even Leonardo da Vinci)[2] or by making flow into one river bed more water than usual so as to cause a veritable flood within the walls of the besieged city (as always the Florentines, under the technical direction of Filippo Brunelleschi, tried to do with the Serchio during the war against Lucca of 1430-31)[3]. The papal initiatives of which Bacci informs us are

[1] "(…) una campagna sanza argini e sanza alcuno riparo (…)" (Machiavelli 1971, 295).

[2] This episode, dated from 1503-4, is described in depth by Masters 1998, especially 93-133. About Leonardo, see also Lee 2011.

[3] We have the account by Machiavelli of this attempt in the *Florentine Histories* IV, 23: "At that time lived at Florence, a very distinguished architect, named Filippo di Ser Brunelleschi, of whose works our city is full, and whose merit was so extraordinary, that after his death, his statue in marble was erected in the principal church, with an inscription underneath, which still bears testimony, to those who read it, of his great talents. This man pointed out, that in consequence of the relative positions of the river Serchio and the city of Lucca, the waters of the river might be made to inundate the surrounding country, and place the city in a kind of lake. His reasoning on this point apparead so clear, and the advantage to the beseigers so obvious and inevitable, that the Ten were induced to make the experiment. The result, however, was quite contrary to their expectation, and produced the utmost disorder in the Florentine camp; for the Lucchese raised high embankments in the direction of the ditch made by our people to conduct the waters of the Serchio, and one night cut through the embankment of the ditch itself, so that having first prevented the water from taking the course designed by the architect, they now caused it to overflow the plain, and compelled the Florentines, instead of approaching the city as they wished, to take a more remote positione" (Machiavelli 1901, 204) ("Era, in quelli tempi, in Firenze uno eccellentissimo architettore, chiamato Filippo di ser Brunellesco, delle opere del quale è piena la nostra città, tanto che meritò, dopo la morte, che la sua immagine fusse posta, di marmo, nel principale tempio di Firenze, con lettere a

moreover in line with other similar measures instituted in 16th century Italy, as in the Tuscany of Cosimo I, who created in 1549 a special Office (the *Ufficiali dei Fiumi*) to care for these issues—although that did not prevent the occurrence soon after of the aforementioned flood of 1557, which concerned the Arno no less than the Tiber[1]. This is therefore an area in which the contrast between the human application and the violence of nature was constantly open, recording from time to time some success of the one or some sudden backclash of the other, according to a dialectic which recalls truly that described by Machiavelli.

A significant testimony of this battle can be offered even by Leon Battista Alberti, who, dealing with the remedies to be taken against the deterioration of the buildings eventually caused by manufacturing defects, flow of time or unforeseen natural disasters, in the last book of *De re aedificatoria* focuses extensively on the waters and the problems posed by their canalization and their containment. Alberti is also well aware of the damage caused by the floods, in the short and long term. With an example presumably taken from his own roman experience he points out that the force of the water can put the strength even of the most solid buildings through the mill, emphasazing in this way the state of perpetual shakiness that characterizes the works of human technology:

> The Bridge of Hadrian in Rome is—I venture to say—the most solid building among many made by man; nevertheless, the floodings reduced him to such an extent that I doubt it can still resist for long. They indeed year by year harm the pylons throwing them against

piè che ancora rendono a chi legge testimonianza delle sue virtù. Mostrava costui come Lucca si poteva allagare, considerato il sito della città e il letto del fiume del Serchio; e tanto lo persuase, che i Dieci commissono che questa esperienza si facesse. Di che non ne nacque altro che disordine al campo nostro e securtà a' nemici; perché i Lucchesi alzorono con uno argine il terreno verso quella parte che faceno venire il Serchio, e di poi, una notte, ruppono l'argine di quel fosso per il quale conducevano le acque, tanto che quelle, trovato il riscontro alto verso Lucca e l'argine del canale aperto, in modo per tutto il piano si sparsono, che il campo, non che si potesse appropinquare alla terra, si ebbe a discostare"; Machiavelli 1971, 729). The dream to see a rival city submerged by the waters must have been well-established in the Florentine subconscious, if already Dante had envisaged a similar destiny for Pisa, in these most celebrated verses: "O Pisa, blot of shame upon the people | of that fair land where the sound of 'sì' is heard! | Since your neighbors hesitate to punish you, | let Capraia and Gorgona move and join, | to dam up at its mouth the River Arno, | and let every Pisan perish in its flood!" (*Inferno*, XXXIII, 79-84; Dante 1996, 321).

[1] About the water policy in Italian Renaissance, see Else 2009, Lazzaro 2011 and relative bibliography.

the trunks and branches which they tear from the countryside and blocking much of the space of the arches; whence it follows that the waters swell, falling then from above, and forming swirling and hazardous eddies that undermine at the bottom the stern of the pylons and jeopardize the entire structure of the work. (Alberti 1966a, 947)[1].

And yet, even more than in Machiavelli and Bacci, in Alberti we find the professional pride of the architect who claims for himself and his art a true civilizing work, performed also through interventions on the rivers, as the large preface of the work underlines. Here, as in other passages, the rivers are indeed conceived as roads, that is as natural ways of communication that, made [200B?][200B?]fully navigable by human action, allow primarily the circulation of knowledge and products between countries[2]. It seems that in the 15th century certain Florentine circles cultivated the idea to hook up to this river and maritime network also Florence, so that Alberti himself mentions its implicitly, at the beginning of *De iciarchia*, when one of the interlocutors of the dialogue, contemplating from the Oratory Bridge the Arno particularly swollen by recent rains, notes with regret that if the flow of the river had been forever that, the city would have had a great advantage, because the galleys could have come there from the sea laden with goods. Someone has conjectured that, a few decades later, Leonardo da Vinci would have actually formulated and presented to the Florentine government a project to make the Arno navigable up to Florence[3]. However, the vision of the river "overflowed into the plain above the

[1] "Pontem Adriani Romae audeo dicere omnium quae homines fecerint operum esse validissimum: tamen alluviones adduxere ut dubitem diutius posse resistere. Stipitibus enim et ramis quos ex agro alluviones arripuere pilas annuis molestiis onerant: et fauces arcus multa ex parte obturatas reddunt. Fit ea re ut aquae intumescant: atque inde ex alto praecipites et molesti vortices corruant et convergantur. Ergo pilarum puppim subruunt: molemque operis perturbant" (*De re aedificatoria*, X, 6). This is the actual Ponte Sant'Angelo. On the *Re aedificatoria* and the activity of Alberti in Rome see the brilliant presentation in Grafton 2002, 283-315; on the theme of water in the *Re aedificatoria* see also Wulfram 2007.

[2] See for exemple Alberti 1966a, 8-10; 324 (*De re aedificatoria*, Prologue; IV, 7). This idea is shared also by the Alberti's friend Toscanelli: in his famous letter of 1474 about the size of the Earth, by presenting the Ocean just as a road which connects West to East, he produces a depiction of the Earth "comme un espace de circulation généralisée, où l'océan n'est plus pensé comme l'Autre de l'*oekumène* mais, sur le même plan et dans le même sens que le continent, comme une dimension de l'expérience géographique" (Besse 2003, 100).

[3] See again Masters 1998.

ground", that "harms the fields, and steal the fruit and merit of the labors from those whom you and others good people would want not happened", is here evoked by Alberti for another purpose, namely to exhort his fellow citizens to moderation in personal and social behavior, because the overcoming of certain limits, just as in the case of the river, only causes destruction and ruin in the civil life (and here Alberti thinks about the greed of the new ruling class city that has literally bleed countryside to grow their own luxury)[1]. As well as the moral and political consequences he draws, is moreover worthy of note that for Alberti, like Machiavelli, the flood is an image absolutely incisive to represent the tragic consequences of the action of forces that the human technique has not been able to adequately fight, despite having—at least partly—the power to do it.

Perhaps still closer to the Machiavellian metaphor is then the impressive vision of *De fato et fortuna* in which Alberti imagines a mountain surrounded "by a river exceptionally fast and swirling", called 'Bios' (that is, Life), where the shadows that represent the divine sparks destined to become men continuously dive and whose banks represent death. In this endless stream some people go ahead "over skins with his brow raised high on the water" apparently safe, but destined sooner or later to break on the rocks strewn just below the surface of river: once plunged into the current, they, having never learned to swim, will be dragged eventually by it and will no longer be able to raise their heads above the water. There are instead other people "who since the beginning rely only on his own strength and that swim throughout the course of life. (…) Aided by their skill in swimming, learn now to rest a moment following a little ship or leaning on a some planks dragged from the river, now to go all out to avoid the rocks". They are the "industrious, capable, diligent, prescient, active and respectable people", which have the support and admiration of the author[2]. The vision con-

[1] "(…) traboccato ne' piani sorpa presso alla terra (…)"; "(…) danneggia e' culti, e lieva il frutto e merito delle fatiche a quelli che tu e gli altri buoni non vorrebbono"; Alberti 1966b, 187-189.

[2] "(…) ambibat fluvius omnium rapidissimum atque turbulentissimus (…); "(…) quos fronte tam elata utribus ab aquis superadstare"; "(…) hi, qui ab ipsis primordiis fisi propriis viribus nando hunc ipsum vite cursum peragunt. (…) qui natandi peritia freti atque adiuti modo otiosi parumper commorari poneque sequentem naviculam aut tabulas fluvio devectas prestolari, modo item maximis viribus, ut scopulos evitent"; "(…) industrios, gnavos, studiosos, providos, agentes ac frugi (…)" (Alberti 2003, 42; 46; 48).

tinues with an articulated description of the ships that glide on the river, with which Alberti platonically depicts the States and their rulers, and also of the wicked men who are stationed in the water without any other purpose than to prevent others from swimming. The conclusion is that

Fate is nothing but the course of events in human life, which proceeds according to its own order; Fortune is easier for those who fall into the river at the very time when they will find there whole planks, or even a boat. Fortune is rather hard on us that we have fallen into the stream when it was necessary to overcome the impetus of the wave, swimming without stopping. And yet, we will never lose sight of the effectiveness of wisdom and industriousness in human affairs. (Alberti 2003, 54-56)[1].

3 The recognition of a connection between the hydraulic engineering works and the complex relationship between power and human freedom on the one hand and, on the other hand, luck or necessity (here understood as forces that are not available to man) is not however the only theme for which the writings of Machiavelli and Bacci resonate. As is well known, among the strategies that Machiavelli indicates to gear up against the blows of fate the "continuous reading" of ancient things, in addition to "experience" of those modern plays a privileged role[2]. The preface to the *Discourses* explicitly theorize this methodology, claiming the epistemological validity of studying the example of the Ancients in politics on the basis of what is already happening

[1] "(...) fatum didici esse aliud nihil, quam cursum rerum in vita hominum, qui quidem ordine suo et lapsu rapitur. Fortunam vero illis esse faciliorem animadverti, qui tum in fluvium cecidere, cum iuxta aut integre asserule aut navicula fortassis aliqua aderat. Contra vero fortunam esse duram sensi nobis, qui eo tempore in fluvium corruissemus, quo perpetuo innixu undas nando superare opus sit. Plurimum tamen in rebus humanis prudentiam et industriam valere non ignorabimus".
[2] Cfr. Machiavelli 1985, 3.

in the fields of law and medicine: in front of the disputes between citizens or diseases that strike them, it is in effect usual to appeal "to those judgements or those remedies that were judged or ordered by the ancients", since, as "the civil laws are nothing other than verdicts given by ancient jurists, which, reduced to order, teach our present jurists to judge", so the medicine is not other than "the experiments performed by ancient physicians, on which present physicians found their judgments" (Machiavelli 1996, 5-6)[1]. Coherently with this basic assumption, the work plan is structured then as a critical survey of the first ten books of Livy, through which Machiavelli discusses the solutions (we might just say the "remedii") that the Roman people have developed to face the political problems which gradually they encountered. Now, Bacci undertakes exactly the same intent, when he writes:

> I could not take a better course, in great and important tasks, than this: to imitate the experience of others, which is the foundation of the art, and the teacher of things. So, once we have dealt with the many measures which the Ancient took to this aim, we shall make use of this reasoning as a guide and a touchstone to judge how valuable, and how expensive, are those projects that in this respect have been proposed by many noble minds. And afterwards, paying attention both to those things that can receive some remedy, and to the forces of the present day, we will work out what remedies are possible, and more suitable to repair so great a disorder of the Tiber. (Bacci 1576, 265-66)[2].

However, this appeal to Ancients is not ingenuous. Indeed, as opposed to an uncritical revival of ancient solutions, Bacci emphasizes the need for their pre-

[1] "(…) a quelli iudizii o a quelli remedii che dagli antichi sono stati iudicati o ordinati (…)"; "(…) le leggi civili non sono altro che sentenze date dagli antiqui iureconsulti, le quali, ridutte in ordine, a' presenti nostri iureconsulti iudicare insegnano"; "(…) esperienze fatte dagli antiqui medici, sopra le quali fondano e' medici presenti e' loro iudizii" (*Discorsi*, Libro I [Proemio]; Machiavelli 1971, 76).

[2] "Io non saprei tener miglior via nelle imprese grandi, et d'importanza, come è questa, che imitar l'esperienza de gli altri; la quale, essendo fondamento dell'arte, et maestra delle cose, fatto che noi havremo discorso de i molti partiti, ch'intorno a ciò da gli antichi si presero, servirà a noi per una guida, et per un paragone a giudicare di quanto valore, et di che spesa sieno per esser tutti quei disegni, che a questo proposito da molti nobili ingegni sono stati posti innanzi. Et appresso, havendo noi rispetto sì a quelle cose, che posson ricevere qualche rimedio, sì anco alle forze di questi tempi, concluderemo, quai rimedii sieno possibili, et più espedienti a riparare a un tanto disordine del Tevere".

cise examination, in order to weigh well what you can recover from them and what no longer makes sense reproduce, being changed in the meantime the urban and natural site of Rome. It is for this reason that he devoted a vast section of the book to the *rimedii* (as he calls them) devised by the Romans to face the floods of the Tiber, like so they have been transmitted from the testimony of historians. He considers carefully their weaknesses and strengths, so that this section of his book assumes—we do not know how voluntarily—the traits of a true "engineering" integration to Machiavelli's *Discourses*, which this theme almost did not deal, because their goal is different. Not to mention that the first example, Bacci takes into account the shift of the bed of the Tiber operated under Tarquinius Priscus in order to move it away from the city: a remedy considered valid "by that time, when Rome was inhabited on mountains, but now that it is all level, this remedy does more harm than good". In the same chapter he also examines the hypothesis of a possible artificial branch of the Tiber—expedient already known in Antiquity because it was believed that it had been realized by the pharaohs with the Nile[1]—, but quickly discarded by the Romans because, though it would have been in some ways the easiest solution for eliminating the floods, it would have had, as a deadly contraindication, the end of the navigability of the river and thus it would have lost any usefulness for a city like Rome ("without the Tiber, there would not have been Rome")[2]. In this way, attentively administering historical-antiquarian and technical-empirical expertise, Bacci analyzes, with even greater attention to details than in the reported example, the remedy prepared by Tiberius, which consisted in creating a system of locks along some tributaries of the Tiber to prevent, after heavy rains, the increasing of their flux rate; the remedy devised under Trajan, of digging a ditch to give an outlet to the Tiber in case of flood; the remedy offered by the construction of a strong embankment along the border of the Tiber itself, such as that made by Aurelian (and more recently, just after the flood of 1557, by the Grand Duke Cosimo in Florence); and finally the remedy consisting in changing the bed of the Aniene (at that time known also as *Teverone*), so as to obtain

[1] Aristotle says, for exemple, that all the mouths of the Nile are artificial, save that of Canopo (cf. *Meteorologica*, I, 14, 351 b 33-34).

[2] "(…) in quel principio, che Roma s'habitava ne' monti, ma hora ch'è tutta nel piano fa più tosto danno che altramente"; "senza 'l Tevere non sarebbe stata Roma" (cf. Bacci 1576, 272-3).

also a source of irrigation for the countryside and a natural defense system for the city.

It is precisely at the end of this scholarly dissertation on the ancient Roman remedies that Bacci places the chapter containing the invitation to follow the behavior of the "good physicians" whence we started and the exhortation to rely on traditional treatments, since it seem that no extravagant solution had ever solved once and for all the problems posed by the floods. On closer inspection, the reasoning which here Bacci carries out is not very different from that adopted at the end of the second book to solve the longstanding problem of potable water of the Tiber. There he had introduced what "is called by the Physicians the rule of experience, of what benefits and what harms" (Bacci 1576, 189)[1]. It—he added - was also followed by "the writers of agriculture, which for not complicate matters to rude wits of workers with many reasons, in order to persuade them if the water in any country were good or not, give them usually just a note—and Palladius writes it very carefully—that is, that they learn how the countryman generally live there healthy and a long time" (*ibidem*)[2]; namely, if the inhabitants of a land are well, it will be a sign that water is good. On the basis of this assumption, noting instead that the inhabitants of Rome seemed to be particularly susceptible to certain diseases, in modern times many writers have pointed the finger at the water of the Tiber, as a major cause of these illnesses. As in the case which we have already examined of those who simply indicate the remedies for floods without knowing their causes, also here Bacci argues against this slapdash empiricism (*alla carlona*, he says in vernacular; cf. Bacci 1576, 190), which for its superficiality loses then also its supposed effectiveness. To Ancients we need to turn, but with judgement. The experience, to be considered truly such, must be always seen in its historical depth, taking into account the mutations that have occurred over time, and that have altered the geographical shape of regions no less than the physical complexion of the

[1] "(…) da i Medici è chiamata la regola della esperienza, di quel che giova, et quel che nuoce".

[2] "Gli scrittori della agricoltura, li quali per non intrigare li rozzi ingegni de' lavoratori con tante ragioni, a persuader loro, se le acque in qual si voglia paese sian buone, o no; soglion dar loro un semplice ricordo, et lo scrive molto accuratamente Palladio, cioè, che avvertischino come i paesani communemente ci vivano sani, et lungo tempo". Bacci refers here to Rutilius Palladius (4th-5th Century A.D.) and his *De re rustica* (particularly to chapter IV of book I; see Palladius 1898, 4-5), whose it was avalaible at that time also two translations in vernacular.

people, so that diseases once common are now vanished and another once unknown now spread death throughout Europe, such as the French disease—and the same is valid for the remedies (and it is interesting to note that floods play a decisive role in this continuing change, since they are the main physical cause of topographical variations of a region and, indirectly, of the health of its inhabitants)[1]. In nature everything perpetually changes, and if one does not pay attention to this, chance blundering:

> the philosophers acquiesce in this wonderful succession of causes in all the effects of nature, and the physicians make it palpable in all diseases and changes in the human body; and it is the same in the transformations of this wider world. It follows that some causes are external and remote, others nearer; and others internal, and these are the most immediate and necessary causes of an effect, that are so chained, that without considering them all from first to last, it will be easy to confuses contingent causes with necessary ones. (Bacci 1576, 193-4)[2].

To understand this world, we need therefore an appropriate logic. Bacci goes on to say, questioning the usual interpretation such a general rule of a maxim of Hippocrates that invites not to drink river water, that the universal propositions

> in this kind of practical philosophy, where we argue according to an historical method about animals, plants, water and rivers, and of their parts and their various differences, are rarely obtained from the good authors: it is mostly made use of indefinite propositions (as the Logicians call them), i.e. indeterminate and equivalent to the particular ones, which are exposed to thousand exceptions and many restrictions, as it happens exactly with this one about rivers. (Bacci 1576, 206)[3].

[1] See Bacci 1576, 193-195.

[2] "Questo mirabil progresso di cause servano i filosofi in tutti gli effetti della natura; et lo fan toccar con mano i Medici in tutte le infirmità, et mutationi del corpo humano; et sono altresì conformi nelle mutationi di questo maggior mondo: conciosia che altre cause sono esteriori, et remote, altre più propinque, et altre interiori, et immediate, et necessarie cause di quello effetto, concatenate in modo, che, chi non ha riguardo dalle prime all'ultime, facilmente piglierà le contingenti per le necessarie".

[3] "(…) in questo genere di filosofia prattica, dove si ragiona per modo d'historia, degli animali, delle piante, delle acque, et de' fiumi, et delle parti, et varie differenze loro, di rado si usano da nessun buono auttore, ma il più si usano propositioni indefinite, (sì come i Logici le chiamano) cioè indeterminate, et equivalenti alle particolari, le quali patiscono mille eccettioni, et molte limitationi, come è propriamente questa de' fiumi".

In this way, we may perhaps have gone a step beyond Machiavelli, approaching rather to Montaigne. However, what is enucleated here is an ideal of science alternative to that purely scholastic, which places in the middle of its investigation a critical survey of experience, in which authority and observation refer to one another in the laborious attempt to develop a new form of knowledge that is partly inspired by a certain way of doing medicine, partly by a certain way to read the history, and that focuses on the complexity of a world, natural as social, which rebels against too rigid schematization. For this the profile of the "doctor of the river" that Bacci outlines here seems us almost partly to overlap with that of *virtuoso* outlined by Machiavelli and to embody in this way one of the most interesting intellectual products of Italian Renaissance. And it invites us above all to consider in a deeper synergy the various crafts that were defining themselves at the dawn of the Modern Age, often combining humanistic interests and scientific rigor in a global vision of well-being, that is the "health", of the communities in which they were practiced. We could learn also something useful for our time.

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Potentially hazardous rafts of ice drift toward a dam on the Dnieper River in March 2012 (Nasa Earth Observatory, 2012, particular; see `http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=77545`*).*