

Chapter 3

A model for maturation

Our mindset is so difficult to see because it is ingrained in us – it almost *is* us. We cannot hold it out in front of us to have a thorough look at it. Rather we see the world through it. We may refer to it as ‘common sense’ because that is what it is to us. However, one notices that common sense is not the same to everybody. Ken Wilber compares the mindset to grammar in our native language. We can speak our native language and use grammar correctly without thinking about grammar. And it is not until the syntax has been pointed out to us in school that we would even suspect such a thing existed.

Human psychological development models are helpful in decomposing our mindsets. The model points out a pattern, where our mindsets develop in a way of layer upon layer. Such models have been developed largely independently by different researchers drawing models that are surprisingly alike. The words in the models are different, but there is no doubt that the researchers found very similar developmental paths regardless of their starting point. The benefits from these models are (1) it provides a clear and logical overview of the human development story stretching from the beginning of human life up until now, (2) the same steps that humans have taken on the grand evolutionary scale is taken by each individual as a process of growing up. When we understand that different ways of seeing the world belongs to different layers of this development, it becomes easier to understand ‘the old story’ and to some extent to navigate towards ‘the new story’.

GRAVES MODEL OF HUMAN DEVELOPMENT

Based on a lifetime of research, Professor Clare Graves proposed a stage-by-stage development model, which our historical mindsets/worldviews follow. The model contains a surprisingly few stages, only six to eight stages. Six stages have been included in our current mainstream world culture, while the two following stages belong to a second tier of stages, which is currently only available to a small but growing number of people. Graves believed that later even more stages would follow as the human cultural story progresses.

The progression of each new mindset stage emerged as a response to changes to life conditions and thereby caused an evolution of society and its capabilities, which again provided new life conditions, causing new changes to life conditions.

Graves' spiral model (Figure 15) of the evolution of mindsets starts with the beginning of the human species and follows human development through periods of hunter-gatherer cultures, agrarian cultures, the industrial era etc. Each era offered different life conditions for the people living in them. Hence, they adapted their pattern of thinking and acting accordingly in order to survive, adapt and thrive. This eventually created new life conditions to which the mindset again had to adapt, and in doing so it became like a step-by-step evolutionary process. When seeing the whole process from above, it looks as if the way it unfolded was almost deterministic, a process that was set in motion over tens of thousands of years ago and continued through its natural cause, stage-for-stage, pattern-for-pattern (Graves, 1971; Beck & Cowan, 2005).

In our own life it is no surprise that mindsets develop over time. What may come as a surprise is that it is possible to decipher in us the six to eight major historical stages on which the mindsets are founded. Each stage has their individual core qualities and values.

Historically, societies stay balanced at one level of mindset for a long time. The appearance of each new level emerges in a time of crises, where people and societies so to say 'outgrow' the old mindset. The new stage of mindset can be seen as an attempt to make effective changes based on the malfunctions of the previous level – like a child that grows out of one way of behaving to take on a more

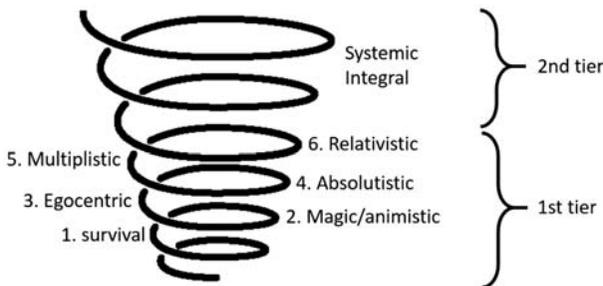


Figure 15 Spiral dynamics model, Clare Graves. (Source: Adaptation based on on the work of Clare Graves)

developed behaviour. Between these stage changes, humanity thrives in relative stability.

Each new level has its negative aspects, its shadow side. As the shadow sides become increasingly dominant, the pressure for a change of stage increases. A crisis in a system can, therefore, be a precursor for a leap forward and upward. Alternatively, the crisis can lead to regression so that society moves back to a previous step. On a large time-scale societies can be seen moving forth and back between levels, before stable success in the progression is achieved. In order to succeed in overcoming the crisis by progression, societies have to move collectively or with enough 'mass' into a new more complex set of cultural values. This is not an easy operation. The times of such changes are tumultuous, and many momentous milestones in world history can be interpreted as struggles between different stages of development. Similarly, we can see a lot of the polarization taking place in the world today as an expression of different mindset levels grinding against each other.

The concept of value memes was proposed by Richard Dawkins to describe a kind of comprised cultural unit representing an idea (Dawkins, 1976). Dawkins saw the value meme as an analogy to the concept of a gene in biology. An example of a value meme could be the quote by Martin Luther King: 'I have a dream' (King, 1963). This quote comprises a comprehensive story and immediately invokes a sense of the values like equality and freedom. In this case, the quote related to equality of people of colour in the US. Another example could be 'the invisible hand' of Adam Smith (1759), which speaks of a different type of freedom, the individual's freedom to act in the market place without thought for the collective. The quote expresses that every man should freely pursue his interests because 'an invisible hand' will make sure that this, in the end, is in the best interest of the community as a whole. So while King's meme is about collective responsibility, Smith's meme is more concerned with individual autonomy. One way to comprehend and see a stage of the developmental process is to look at the belonging value memes. A stage can hence be characterised by a cluster of value memes that tell a story about the self-perceived role of humans.

The function of the value memes belonging to a mindset stage is to help everybody interpret and align themselves according to the values at that stage. Most individuals generally make this alignment with the unconscious purpose of belonging to his group of peers. The value memes work as a kind of mindset handrail to align people around these values. It provides a similar navigational map for everybody on that stage. This helps us to interpret each other and keep each other appropriately accountable according to the stage. Or in the case of change of stage, the new memes foretell and attempt to capture important aspects of the new stage, so that everybody can see it in order to move forward.

Graves identified six general stages that can be tracked in the process of the emergence of human beings up until today. As each stage occurs, the old mindset is transcended but, at the same time, there is a kind of integration of the old

mindsets. The old mindset is carried with us on the journey ahead in a kind of ‘inner’ packaged form. The old ideas and memes still exist and create a kind of mixed amalgam mindset. Different mindsets can handle various problems so that problems are often handled only at the minimum required level of complexity. Depending on the developmental strength of the different stages, individuals may not have solid access to higher stages of mindsets and hence must handle their problems at the insight level that is available to them.

In that sense, the stage development is like a new ‘shell’ around the old mindset, providing new tools and different ways of looking at life and our role in life, similar to how Kalundborg Utility expressed their strategy as a continuation of old values but embraced by a new layer of values related to sustainability.

Ken Wilber (1996) who has studied the human developmental process, pointed out that Professor Graves’ spiral model corresponds well to a number of other developmental models developed in other contexts. These are models from Gebser, Piaget, Kegan and Loevinger. Their models were developed more or less independently, but the stages that they identify describe a similar developmental process, though focusing on different aspects of the stages.

When we are looking for a vision for the water sector of the future, the models provide valuable insight. The description helps us understand how the general global human culture is moving, and by doing so, the understanding can both inspire and help us align. It can also point out some of the key features of the new story and help us transcend our current gridlocks. Finally, it can also identify how the value memes or key ideas in how we work today emerged, from which kind of thinking it came. Additionally, I think we can also see that our practice in water engineering has elements from all levels. Understanding the higher levels can provide inspiration for how to transcend and include current practices, peacefully and recognisably. Overall, I find this model to have interpretive value both for the future and for what is. A short description of the stages follows. Each stage is assigned a number and colour code as well as a few descriptive words. The reason for the colouring is that each of the stages is each so rich that the assigned words are only covering the patterns of thinking to a very small extent. To name it by a colour makes it more memorable and enables a continued expansion of the understanding of the facets of the mindset.

Your reflections: How would you identify aspects of your mindset that differ from others – not just difference in opinions?

FIRST STAGE, BEIGE – SURVIVAL

The first base level is about survival. With this mindset we are occupied with our most basic needs of food, water, warmth, shelter etc. These needs are hard-wired

into the human physique. Leaving any of these needs unmet for even a short period of time causes physical pain or eventually death, pains of hunger and thirst, but also a myriad of different pains and discomforts signalling that something needs to be taken care of in the body. For many generations we have had an infrastructure that is organised to handle all these needs at all times – at least in the more developed part of the world. Comparing to hunter-gatherer societies where survival depends on finding and hunting prey, most of us live in societies where these needs are met in an easier way. Today, in affluent countries, many people may not even experience thirst or hunger to any severe level throughout their life.

Water is one of the most fundamental needs of the body as the body consists of 60% water that needs to be cleaned and replenished. The water is used for a multitude of purposes in the body: to regulate body temperature, as a matrix for the production of a multitude of hormones and neurotransmitters, allows new body cells to grow, reproduce and survive, works as a shock absorber if the body falls or is hit and is crucial in the protection of the spine and brains, distributes oxygen throughout the body, helps the body stand erect, lubricates joints, flushes unwanted body waste in the form of urine out of the body, keeps membranes and helps digestion. Similarly, food is an important basic need as it supplies energy to the body, making it possible to move, keep warm, think etc.

It is rare to see grown-ups who only have access to this development stage, but it can be found in people who have severe brain injuries or Alzheimer's. According to the theory, we have all to grow up through the different developmental stages, and hence we all start at this square one as newborns.

In general, this stage is for obvious reasons assumed to be quite primitive. However, our forgetfulness of our body and its physiological needs may tell a different story; a story where in spite of this level being easy to satisfy, our 'body forgetfulness', bad drinking and eating habits contribute to unsustainability at this very core level. By having the basis of physical sustainability handled at an almost automatic level, we may have lost some of our own physical sense of the fragility of bodily sustainability.

Therefore, to get a more direct physical sense of sustainability is to focus attention on our own bodily sustainability. To sense how the water we drink and the food we eat sustains us. To make drinking and eating something we do mindfully. Some have taken drinking and eating to an art-form as for example, the sommelier who has trained the ability to recognise various taste elements in wine, chefs of advanced cooking is another example. Today, a few people work with water taste as an art – as water sommeliers. Some of the parameters a water sommelier rates are saltiness versus sweetness, smoothness versus complexity, contents of sodium, magnesium and calcium and the water's bitterness. The development of ability to tasting water is one example of how we can advance our appreciation of the most basic level.

In Danish, there is a wonderfully illustrative meme about this level which is often said when we have to go eat (it rhymes in Danish): ‘Uden mad og drikke, duer helten ikke’ – ‘Without water and food, the hero doesn’t work’.

Your reflections: How much do you know about the taste of water? How can you feel that you yourself is more than half water? How does the water inside you feel? Can you remember being thirsty and having that need met with pure water?

SECOND STAGE, PURPLE – MAGIC AND ANIMISTIC

The second developmental stage is where humans start organising survival in small collaborative groups, hunting, travelling and living together. ‘You watch my back, I’ll watch yours’ would be an example of a meme belonging to the second level.

This level is called magic and animistic because the collective inner cultural world is full of stories of spirits. The surrounding world is alive with spirits and magic. Many cultures are still full of stories based on animistic understanding, where trees, water, rain, mountains etc. have each their benevolent or malignant spirits. People are working together with the spirits, trying to please them to make survival possible and life comfortable.

Many spirited stories are about water because water is still key to survival, not only of humans but also of the prey they needed for food. [Veronica Strang \(2004\)](#), a cultural anthropologist, explains that the water deities belonging to these early societies were often local beneficent creatures with which humans went into partnership with. That doesn’t mean that they were soft, they could be dangerous as well and in, for example, Australia, water spirits were closely related to ancestral law and could swallow you if you transgressed. So the water creatures were powerful and could both generate life and take lives.

Also, this stage is not very prevalent in today’s modern world but is most vivid in original cultures. When I feel – on occasions – that the relationship with water becomes too materialistic and ‘dead’ it may be that this level of my mindset senses something lacking.

Your reflections: Are you attracted to the stories of myths? What may these stories bring that nothing else can provide? How is your connection to the myths of your culture?

THIRD STAGE, RED – EGOCENTRIC

While the first and second stages are rare today, the third egocentric level is fairly mainstream. In this stage, humans work to gain a higher level of

individualisation, trying to become ‘one’s own man’. The concept of ‘power over others’ comes into the arena.

The stage emerged when the groups from the second stage reached a level of collective infrastructure, where the pressure of external natural dangers had resided a bit to the background. The societies had succeeded in becoming so safe that strong individuals dared challenge the ‘ghost stories’ of the spirited view of things, suddenly perceiving the story as more imaginative than real. In the ears of the young, the stories stood in the way for their wish to be free and independent.

In the most benevolent forms, it caused a sense of being an independent individual, in its more malevolent forms it caused societies to be riddled with power games, wars and seeking of dominance. Extreme malevolent leaders working from this third stage include people like Hitler and Stalin, but people working from an egoic point of view is common everywhere. There is in this stage also power and radiance in people of this conviction, that make them look as potentially strong leaders for leadership positions. So they are found in leadership positions everywhere, often with negative outcomes for those below them.

‘Power’ can be defined as the drive or ability to affect change based on one’s own will and motivation. If the will and motivation is positive, power is positive. Churchill was seen as a strong but also somewhat abrupt person, possibly because he had a lot of this stage in him. This was effective in handling the situation of World War 2, but it was not effective in the more complex world that followed thereafter. Hence, he lost the elections soon after the war.

In a water perspective, the water wars are relevant from this stage of operation. This is a stage that is best captured by memes such as ‘survival of the fittest’ and ‘law of the Jungle’. Therefore the stronger and more fortunate, i.e. in this case upstream located communities, can dominate the less fortunate downstream communities by cutting off water. As this is intolerable for the downstream communities, war and power struggles ensue.

There are many examples of keeping water sources for oneself rather than collaborating in the world arena, i.e. between Israel and Palestine and around the water resources of the river Nile. But there are other more subtle ways of conflict, like neglecting to keep the waterways clean, in this way the downstream water is of a deteriorated quality and sometimes impossible to use for agricultural, industrial or domestic uses.

Your reflections: How many of the people you work with are grounded primarily in this level of mindset? How do you experience that? Can you recognise the feeling of this mindset in yourself – in certain situations? Can you see both bright and dark sides of this mindset?

FOURTH STAGE, BLUE – ABSOLUTISTIC

The fourth stage is organised around a ‘law and order’ mindset, where the impulsivity of people from the third stage is reined in by rules and regulation and hence the less fortunate in strength are again offered protection by society. Behaviour and interactions between people are regulated by laws or strong dogma. This is where large organised religions come into the world.

The story of King Arthur can be seen as a transition from a third stage society with warring lords and a country in turmoil to an ordered and peaceful country with a strong heartfelt dedication to King Arthur, a dedication that is not due to ruthless domination, but rather due to ‘god-given authority’ handed to Arthur by his drawing the sword out of the stone.

People are assigned clear positions in life, usually already from birth. Being the son of a shoemaker, you will live and die as a shoemaker. This is also the kind of thinking that can produce large empires. Empires could not be achieved solely with a third stage mindset, as the power is concentrated in one person at that stage – that is simply too primitive to base the foundation of an empire upon. The radius of the leader’s power is limited to his personal outreach extended by his first-line henchmen. To build empires requires organised courageous men with hearts burning for a cause or a ‘god-like’ leader – and it requires rules and regulations.

It is a stage of great loyalty towards one higher god and one cause as exemplified by the crusades. Historically, at this stage ‘the divine’ transitions from the many spirits or demigods at stage one and two to the one God placed high up here at stage four. Margaret Strang (2004) explains that water spirits are portrayed as serpentes and dragons to be slain by heroic men in service to God above. Water spirits are no longer something to be partnered with; it is something to gain dominion over. Small amounts of water are made holy by the touch of the priesthood and used in holy transformations such as baptising. Hence, there is in this mindset a wish to control and dominate nature – and water.

Not all rules and regulations can be said to stem from this mindset, but the idea that rules can be used to rule the world and blind faith in these rules belong to a worldview based in this stage. I have good colleagues who, when asked of their work purpose, state that it is primarily to manage water so that they comply with the relevant regulation. Nothing beyond compliance is required, it is almost ‘illegal’ to do better as it may cause an additional cost. This is also the mindset that Christina Woods spoke out against in her paper ‘You can’t negotiate with a beetle’ (2010) – interestingly supported by ideas with roots in an indigenous look at the world. The idea of ‘natural law’ as proposed by [Oren Lyons \(2004\)](#) is founded in first and second stage experiences and memes.

Your reflections: ‘You must, have to, shall, should’ – how would a day without these words look like? If ordering yourself and others around was not an option, how would you get things done?

FIFTH STAGE, ORANGE – RELATIVISTIC AND RATIONAL

At some point the fourth level society became perceived by some as over-regulated. It had a confining feel to it, and there was a need for individualisation – again as in stages three and one. The fifth level is a rebellion of the individual. The absolutistic system had become too clever in regulating every part of life and individuals longed for their personal freedom again, perhaps especially those who had been assigned less generous roles in society. However, it is a different kind of freedom than the ego-centric freedom of stage three. It is the freedom of, for example, Martin Luther (born in 1483), who insisted that people can think for themselves and apply their own good interpretations of the Bible, thereby undermining the power of the clerical priesthood in Germany and later in large parts of Europe.

He thereby provides the Christian God with a new place, not in churches but in each individual's own mind, heart and interpretation. This was revolutionary! Suddenly, the Bible became translated so that everyone could read and think for themselves. This is a clear break from having clergy interpretations of moral standards told from above by a priesthood that appeared at times to interpret the word more in line with power dynamics (stage 3) than as intended.

Stage five also marks the beginning of the age of science, invention and rationalism. The idea of God is challenged; the earth is (in our minds) moved from the centre of the solar system to a place less divine, orbiting the sun together with other planets. Rather than seemingly arbitrary God-given rules administered by the top of the hierarchy, the Church being too much affiliated with the 'worldly' power, individuals start thinking independently and their position on the societal ladder is no longer determined by birth. Social mobility is enabled by merit, industriousness and inventiveness. Adam Smith's concept of 'the invisible hand' (1759) belongs to this mindset. Hence it is a time for increasing competition as hierarchical positions become fluid rather than pre-defined from birth. The industrial revolution is rooted in this mindset where the harnessing of heat and water marks the onset with the invention of steam machines. Thoughts of economy governing the lives of individuals and society to the extent that brings us the crashes of Wall Street and the power of large corporations belong here. The underlying mindset is one of science and rationality. This is still the dominant mindset of this age.

However, it is also the stage where taking a third-person perspective grew as a mindset tool for everybody. Great political changes appear at this stage. Equality of gender and race is a key battle. Slavery is abolished in many countries for the first time in history. Women gain the right to vote.

At this stage, the human understanding of time changes from a grounding in the annual cycle of time defined by the changes in seasons to an understanding grounded in time as moving forward – time is stretched out before and behind us. Change, improvement, development, visions, to the ability to think of alternative scenarios and ways of organising is taken to a whole new level. This concept of

time stands in strong contrast to previous mindsets anchored in a circular understanding of time where spring follows winter.

Water infrastructure advances notably under this mindset, from latrines to sewer systems, to wastewater treatment plants, to sensors, control and automation. This is the stage where Edward Snow found out the role of microorganisms in some diseases. There are no more spirits or gods to be found in water. Water is a cheap resource for the progression of human lives, and the focus is all on human comforts by engineering in the urban water cycle.

While each change of stage has led to a significant increase in the comfort of living for people, no single stage has been so transformative to earth and material capabilities as this change. The results of cutting-edge science within all areas of life must have been almost unimaginable at the onset of this stage shift. The human race is so successful in gaining resources for itself that it has outcompeted every other species for all relevant kinds of resources. Nature is no longer perceived as a threat and where nature inconveniences are experienced, technical solutions are found.

The shadow side of the fifth stage is global degradation and break-down of natural sustainability of major life ensuring systems. This is not to be misunderstood so that this stage is synonymous with unsustainability, but the means with which the human race can be unsustainable are so powerful at this stage that the global ecosystem is impacted, not as in early historical periods, where local areas could break down, and be left again to recover later.

'Men and women, everywhere and at all times, have despoiled the environment, mostly out of simple ignorance.

Modernity's ignorance about the environment is much more serious, simply because modernity has many more powerful means to destroy the environment.

Tribal ignorance, on the other hand, was usually milder; but ignorance is ignorance, and is certainly nothing to emulate.'

Ken Wilber (1996)

Your reflections: What are the bright and the dark sides of this mindset? If you were to move forward and hence both had to transcend and include this mindset; how would you do that? What would you bring with you?

SIXTH STAGE, GREEN – RELATIVISTIC

This stage is a reaction to the loneliness and dispiritedness of the fifth stage. At this stage the primary focus is on harmony, everybody being heard and everybody being equal. This is a reaction to the raging competitive individualisation at the previous stage; this is the emergence of postmodernism. The sixth stage is green, the counter flow entering the public world stage in the flower power movement of 1968 in the

western world. Later this results in new types of companies like ecological food markets. The mindset tries to bring an egalitarian worldview to the centre stage, despite all difficulties. The mindset is most easy to distinguish in the Nordic countries and in cities like San Francisco. The Martin Luther King quote of 'I have a dream' belong to this mindset; it is the stage of Occupy Wall Street, Greenpeace, Amnesty International and Doctors Without Borders.

The sixth stage arrived in the water sector with a turn of focus towards the environment. Due to the water sector's dependence on one of the most basic elements in nature, the water sector had to understand and deal with environmental concerns early. As it became apparent that the industrial handling of water had severe ecological effects, the focus in the last quarter of the 20th century has increasingly been concerned with the state of the environment. The problems created by industrialisation came to most people as a shock. Societies had optimistically and without any second thoughts assumed that nature could handle any activities the human mind could think of. There simply was no theory or attention to what negative impact the growth could have on nature. Up until now, nature was seen as an inexhaustible resource to be extracted and converted to the satisfaction of humans many needs and desires. What happened with waste from this process was not conceived as a problem. There was this innocence of unknowing the detrimental effects for a few decades.

In Denmark, the environmental mindset entered the public when dead lobsters showed up in the angler catches from the sea of Kattegat. They had suffocated due to lack of oxygen. Suddenly the public realised that the societal effect on the environment was not 'slightly detrimental', but rather catastrophic; something needed to be done. This led to the expansion of wastewater treatment plants handling both solids, organic matter and the key polluting nutrients nitrogen and phosphorous. In this move, utilities have changed from being merely an infrastructure provider to becoming a central environmental service in societies.

Your reflections: If you were to understand this mindset better, who would you speak to? What would you ask?

CHARACTERISTICS OF GRAVES MODEL

Graves theory is known as 'the emergent, cyclical, double-helix model of adult biopsychosocial systems development', better known as 'Spiral dynamics'. The progression through the mentioned mindsets can be organised according to a forward-moving spiral. The consecutive levels of patterns of thinking are organised on an expanding spiral so that, in a sense, for each turn of the spiral the previous levels are both encompassed and transcended. Each new level consists of a more encompassing and hence more complex way of thinking.

Three characteristic processes can be seen taking place in the spiral form of the process.

The first characteristic process is that the mindsets cycle between two extreme poles. One pole is a mindset that is moving against nature and the collective and its participants are very much focused on 'me and mine'. When this mindset is dominating (stages 1, 3 and 5), competition has priority over collaboration. At some point, however, this mindset leads to the beginning of disintegration of society, coherence suffers, societal values are under pressure. Then the spiral moves towards the opposite pole into harmony with nature and the individual's co-participation in its society; the focus changes to 'we and our'. These levels are characterised by 'higher ideals' and collaboration to build something larger together. At some point this becomes too restricted and oppressive for the individual to bear and the longing for individual freedom forces a change. In that sense, the spiral moves toward a stronger expression of self and its freedom for each level up along one side of the spiral. On the other side of the spiral, it moves into more and more harmonious integration of the collective. In a very simplified notion, it is a dialogue between safety together and freedom alone.

The second characteristic process is that the size of organisations the individual belongs to increases with each stage – as does complexity. At stages one and two, the attention revolves around the individual and a narrow family. At the third stage the group under control of a strong leader grows, however, it still depends on the strong individual's ability to manage the whole group by means of a few degrees of links from the strong leader. Everybody has a strong feeling of being part of an in-group against the rest of the world. At the fourth stage, the community makes a leap in size. Individuals now belong to large countries, ideologies and religions. This is a stage of great patriotism and loyalty to the cause and culture of the country or religion one identifies with. Still it is clear that there are the ones on our side and 'the infidels' on the other side, belonging to the other religion or the other country. In the sixth stage, the humanistic point of view tries to make away with all borders and boundaries toward equality for all, despite sex, race, religion etc. Thereby, the 'foreign' is embraced and attempted assigned equal rights, and there is this vision of one big (happy) humanity.

Hence, for each stage up, the individual's life-world span is enlarged. The individual's ability to mentally and emotionally increase his or her span becomes a precondition for the personal development along the spiral. Higher levels of mindsets on the 'we' part of the spiral have an expanding view of who 'we' are. Similarly, on the side of the 'me' side of the spiral where competition is more important, here the competition field expands from local towards global.

A third characteristic of the spiral is that the time at each stage becomes shorter and shorter. [Beck and Cowan \(2005\)](#) who interpreted Graves' model for practical use, tried to set a point in time where the evolutionary spearhead of humanity started thinking at a new stage. They came up with the following estimates. The beginning of the first stage lies 100–200,000 years back, the second stage lies

50,000 years back, the third stage has been around since possibly 10,000 years ago, the fourth stage rose 5000 years ago, the fifth stage started 1000 years ago and the latest stage to be reached by a significant amount of people, the sixth stage, was established 150 years ago. Today all the mindsets are present globally. The fifth stage mindset is dominant in leading countries like the US and Europe, followed closely in priority by the previous fourth mindset, and with the sixth 'green mindset' is on the rise. So there is a large time lag from when the first thinkers begin to explore new ways of thinking until it becomes part of mainstream society and even longer until society and individuals have arranged themselves so that acting from a more advanced stage becomes the dominant way of operation.

At some point the centre of gravity in a system (e.g. country, city, organisation, family, community) shifts. This is usually a noisy event regardless of whether the system is moving up or down the spiral. The Second World War could be used to illustrate this as an example of a red mindset (Hitler's Germany) battling a generally blue mindset (Churchill's United Kingdom). After years of fighting and an attack on Pearl Harbor, the orange mindset (US) came to the rescue from Roosevelt's United States bringing advanced technology and a scientific mindset. Reflections followed the warlike 'what could have moved the world into such a frenzy?', and not least 'what could lead such a large part of the German people into the arms of fascist thinking?' The results of these reflections led to a humanistically centred philosophy of unity and collaboration and the formation of 'green mindset' ideas such as the United Nations.

Every individual performs a personal development process going through corresponding personal levels of development. Starting from the beginning and landing at the level that matches the life conditions in which he/she finds themselves in terms of environment, family, network, culture, country, education, job etc. Hence, the development process can be understood as a way of understanding history, a way of understanding societies and a way of understanding the personal development processes and maturity levels of individuals.

Hence several mindset stages are present in each of us, and different mindsets may dominate in different areas of our lives. The mindsets are organised like the layers of an onion. The values of the individual generally gravitate toward the values of the group he or she primarily identifies with. As a rule of thumb, most people identify 50% with one level and 25% from a level above and 25% from a stage below the main step. Hence, generally, it is possible for most of us to understand mindsets that are further behind in the spiral and slightly ahead. It is however difficult or impossible from one's most advanced mindset to understand the mindsets ahead of this point on the spiral. Hence, people in the orange mindset will mostly scoff and shake their heads at the 'unrealistically idealistic naive types' of the green sixth mindset stage. People at the sixth mindset are known to scoff at every earlier mindset, seeing them as too simplistic. A key weakness in the green mindset is the strong assertion that everybody is equal, while at the same time they do not see people based in earlier mindsets as equal

at all. People operating primarily from the red egocentric mindset tend to try to close all the long-winded discussions to ‘*just go out and do something*’.

When belonging to a ‘higher’ mindset level you might think that in ‘the kingdom of the blind the one-eyed man is king’, but that is not the case. Higher levels are not always advantageous. In general, the model suggests that the ‘best’ level of thinking is the one that replies best to the surrounding life conditions. Since being part of a ‘human culture’ constitutes a large part of a person’s living conditions, most of the participants of a society will generally cluster around the same level since this for each individual is the most effective. The incentive to develop to reach that level in one’s maturing process is high (or you will be excluded as an immature individual) however, the incentive to go higher than that shared level is low or negative. You may by such a step easily exclude yourself from your culture. To this Graves’ comments:

‘I am not saying in this conception of adult behaviour that one style of being, one form of human existence is inevitably and in all circumstances superior to or better than another form of human existence, another style of being.

What I am saying is that when one form of being is more congruent with the realities of existence, then it is the better form of living for those realities.’

Clare W. Graves

When I look through the developmental levels of the model as described, I recognise periods in my life where each of them has been dominant and I am able to connect again to these earlier periods and thereby see the beauty and the courage of each level. For my life’s journey, I think each level had its own importance, it was a prerequisite that I took on the set of values completely and wholeheartedly to exhaust the values completely in order to reach the limitations at each level.

A thing that often confused me is that at each stage of my life it was as if the words did not mean the same thing anymore. The model has helped me understand why this is so. The word ‘courage’ for example, as described at each level, has quite different meanings. From a red mindset of physical courage, you may not be able to recognise the courage at other levels as courage at all. You might even take it for cowardice. It is clear to me that when developing my patterns of thinking, each level has had its own type of courage to enable the knowledge or wisdom for the next stage to emerge.

At the third egocentric stage, the courage was about saying ‘no’ to being dominated, but instead to stand up against domination – and at times even being the dominating part. At the fourth absolutistic level, courage was, in a sense, to give up my self-interest for a higher purpose. At the fifth rational stage, it was about the courage and self-reliance to go outside the protection of convention and religion and to follow my own understanding, ambition and sense of what was right. At the sixth relativistic stage, it was the courage to step out of the competition and instead trust and lean into the community around me.

At each stage, my usage of each set of values felt ‘through and through right – all the way into the marrow of me’, making me feel on the ‘right path’. The crises preceding each shift were slow and filled with moving forth and back in a regression-progression pattern and not an epiphany ‘from one day to the other’ kind of shift – though epiphanies did occur. But the process was more a number of slow realisations of something being off:

‘I do suggest, however, and this I deeply believe is so, that for the overall welfare of total man’s existence in this world, over the long run of time, higher levels are better than lower levels and that the prime good of any society’s governing figures should be to promote human movement up the levels of human existence.’

Clare W. Graves

Seeing the world through the spiral perspective leads to a different understanding of many of the global conflicts and smaller conflicts in the local society, all the way down to conflicts in the workplace.

‘Different worldviews create different worlds, enact different worlds, they are not just the same world seen differently.’

Ken Wilber (1996)

Steven Solomon writes about the role of water in the process:

‘Those unable to overcome the challenge of being farthest removed from access to the best water resources, by contrast, were invariably among history’s poor.

History was littered with societies that declined simply because they could not overcome the deleterious local-resource depletions and population expansions accompanying their own initial success. Signature water challenges evolved from era to era.’

Steven Solomon (2011)

The primary reason for water’s importance in the developmental process is its fundamental nature. Without water, every stage that builds on top of this ‘square one’-need crumbles. Steven Solomon orders the reasons for water’s importance like this:

- (1) Domestically for drinking, cooking, and sanitation (stage 1 and 2);
- (2) Economic production for agriculture, industry, and mining (stage 5);
- (3) Power generation, such as through waterwheels, steam, hydroelectricity, and as a coolant in thermal power plants (stage 5);
- (4) For transportation and strategic advantage, militarily, commercially, and administratively (stage 3 and 4)
- (5) Of growing prominence today, environmentally to sustain vital ecosystems against natural and man-made depletions and degradations (stage 6).

Though he does not order the reasons according to spiral dynamics; the purposes can be recognised as belonging primarily to different stages of mindsets. Hence, water is clearly in dialogue with the evolution of new mindsets, sometimes enabling and at other times responding to needs.

The understanding of spiral dynamics represents a key pattern that enables a profoundly effective understanding of current conflicts and potentially also offers tools to resolve the conflicts. The ability to mediate these conflicts will be central for the global society's ability to move forward towards a sustainable future. These mindset conflicts are one of the major reasons for the lack of real progress in the area of sustainability. And many of these conflicts can be interpreted or traced back to the conflict between, especially, the four latest mindsets; the third stage egocentric, the fourth stage law and order, the fifth scientific and rational and the sixth green sustainability and equality focused stage. Generally, all levels in the first tier are in some kind of basic conflict. Only second tier mindsets are able to embrace and include all first-tier paradigms reliably and systematically. This emphasises the importance of SDG number 17 of global partnerships for sustainability. Hence, the understanding of these levels can prove central to securing water for all moving forward.

Even if the sixth green stage is not currently the dominant stage, it is already possible to see some of the shadow sides of this mindset, and it is evident that to truly transcend the current sustainability deadlock a mindset with more capabilities than the sixth stage is required. Some of the problems of the sixth stage are that it claims to be inclusive and regarding everyone as equal while holding a serious grudge against everybody, who doesn't see it like this. Plus, as anybody who has been involved in this type of 'green project', it is clear that 'green' has a hard time making decisions at all – which may create all kinds of problems on its own.

There are issues of great inefficiencies in decision-making processes as the mindset attempts to listen and include everybody convinced that it is possible to find a solution, that everybody finds acceptable and that harmony will emerge from that. When this idea meets the real world of a rainbow of mindsets, this is not a dead-sure result, obviously.

Beck and Cowan write in their book 'Spiral Dynamics' about the end of the sixth stage mindset: 'The beginning of the end of this value-memes dominance is when the person begins (again) to get things done, and done well, all alone. [...] A bit of disharmony becomes natural and one's tolerance for open contradictions grows. [...] Perhaps the most significant marker of the existing of GREEN/yellow [the exit of this stage] is the dropping away of fear. Life is life, after all. Tribal safety [stage 2], raw power [stage 3], salvation for all eternity [stage 4], individual success [stage 5] and the need to be accepted [stage 6] diminish in importance. Instead, there is a growing curiosity about just being alive in an expansive universe'.

Your reflections: Is this model of any explanatory help to you? How can you see the model play out at work or on the international scene? How is this knowledge applicable in your work?

SECOND-TIER MINDSET

So what will be next?

Graves' model predicts that what happens next will be a momentous leap forward. Something fundamental happens in the shift from sixth to seventh stage. In Graves' model every mindset stage after the sixth stage are called second-tier mindsets – while stages one to six are referred to as first-tier mindsets. The major differentiator between first- and second-tier mindsets is that the second tier mindsets are not fear-driven anymore. Looking at Maslow's pyramid of needs, (Figure 16) there is a similarly remarkable shift when the individual has organised their ability to fulfil their needs on the lower levels sufficiently to such an extent that they start being occupied with self-realisation. This is predicted to be the most important enabler to move to the second-tier stages.

Key values and skills at the second-tier mindset are integrative, systemic, ecologic, authentic and better balanced. A distinctive feature is that at these levels, fear is almost absent. When looking at the world from a second-tier mindset, the world is conceptually different. Second-tier mindset has the key drive or purpose of stitching the world together, of overcoming the fragmentation and of enabling self-actualisation personally as well as collectively. This is a

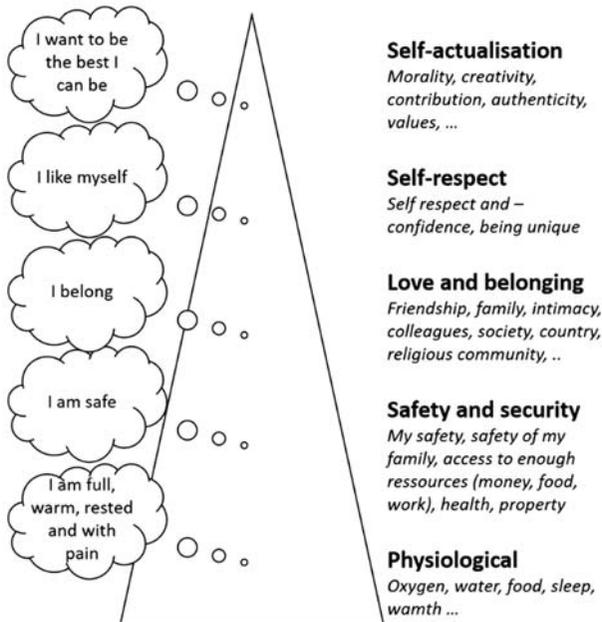


Figure 16 Maslow's pyramid of needs. (Source: Adapted based on Maslow's pyramid of needs)

generous and open mindset where everybody is supposed to contribute based on their talents.

Earlier boundaries, delimiting one mindset from another or delimiting one country from another, in this new view, are transformed to something less fearful – something like mere landscape features.

'If the god is a tribal, racial, national or sectarian archetype, we are the warriors of his cause; but if he is a lord of the universe itself, men are brothers.'

Joseph Campbell (1949)

The realisation that becomes available to second-tier minds is that the joint and individual goals are not fundamentally in conflict.

An example of this change of mindset can be seen in the arena of environmental thinking. In this new mindset it becomes increasingly clear that taking steps to protect the environment is not – as earlier believed – a commercial hindrance. Instead it can finally be distinguished as a benefit for all. In this new mindset it is suddenly understood that environmental protection is both meaningful and valuable. What was earlier suggested from a primarily moral point of view, and hence consciously or subconsciously fought against because of the restrictions it proposes, can now be embraced because the 'meaningfulness' is clear. And the patterns can be enacted far more precisely when they are deeply understood rather than when they were interpreted from a dogmatic moral point of view, with its flavour of lifeless theory.

Hence, seen from the point of view of spiral dynamics, the question of this book may be re-formulated into: How will/can/should our relationship with water develop when we enter a second-tier mindset and how do we transcend our current mindset about our relationship to water into the framework of this new mindset – a new pattern of thinking about water? This kind of mindset will enable the solving of the current water crises.

Your reflections: Does a second-tier mindset seem attractive? Which characteristics would you appreciate? There is some controversy as to whether one can move ahead alone, or it is more a thing that happen to you – what do you think? How would you describe your personal practice?

CHANGE IN THE SCIENTIFIC PARADIGM

I was challenged by a teacher of mine to describe the difference between the old and the new mindset seen from a scientific point of view. At first the question puzzled me, but as I started making the list it soon became clear that though I had not thought of it that way, I knew of a distinct shift taking place between

‘old-school’ science and a ‘new-school’ science. By taking a step back and looking into the patterns of changes, some descriptive concepts can be identified as the old and the new paradigm. The list I generated based on my understanding and my reading was:

The Currently Dominating Old Mindset	The Emerging New Mindset
The mechanical science paradigm	The systemic science paradigm
The study of objects	The study of life
Machine dominant as a metaphor	Organism dominant as a metaphor
Primary focus on quantity	Primary focus on quality
Linear	Non-linear
Simple – as billiard balls	Complex – as in biology
Isolation of phenomena	Phenomena are connected
Objects and affect	Structure and relationships
Utilitarian purpose	Purpose of understanding
The whole is a sum of the parts	The whole is more than the sum of the parts
Standardisation	Diversity
Material systems	Living systems
Shallow ecology	Deep ecology (Arne Naess)
Anthropomorphic (man in the centre)	Humans as one (highly developed species together with others)
Nature has instrumental value	All life is valuable in itself
Hierarchy	Network
Reductionistic	Synthesis
Mental	Whole person view
The world as material	The world alive
Entropy	Homeostasis and autopoiesis
Precision	Patterns
One-to-one rules	Symbiotic fit

The list was strongly inspired by Capra and Luisi’s book *The System’s View of Life* (Capra & Luisi, 2014). Here they write:

‘A central characteristic of the systems view of life is its nonlinearity: all living systems are complex – i.e. highly nonlinear – networks; and there are countless interconnections between the biological, cognitive, social, and ecological dimensions of life.’

Capra and Luisi

The new paradigm does not mark an abrupt departure from the old paradigm. In favour of the old paradigm, they write:

'What makes the scientific enterprise feasible is the realization that, although science can never provide complete and definitive explanations, limited and approximate scientific knowledge is possible. This may sound frustrating, but for many scientists the fact that we can formulate approximate models and theories [...] is a source of confidence and strength.'

Capra and Luisi

In regards to understanding what this means to our relationship with nature echoes the ideas of Naess as they assert:

'Logic does not lead us from the fact that we are an integral part of the web of life to certain norms of how we should live. However, if we have the deep ecological experience of being part of the web of life, then we will (as opposed to should) be inclined to care for all of living nature.'

Capra and Luisi

These change concepts can be interpreted in a number of different ways, examples of transformations taking place already that seem to work in the direction of this paradigm shift are:

(1) An increasing role for biology

We have over the last decades seen an increase in the inclusion of biotech processes in technical water systems and our deepening understanding of the role of microbiology in our systems is a slow change of paradigm from a mechanistic perception to a more microbiological and life-based view on treatment.

For a long time bacteria were feared in drinking water, while now it is becoming more and more well known that bacteria are everywhere and that most are benevolent and we need only fear a subset of them.

Microbiology has been used in water treatment for a long time and is hence not necessarily a new thing, but what is new is the recognition of this and the study to understand the details of it. This is true in wastewater, but perhaps even more so in the increasing understanding of the microbiology involved in water treatment on the clean side. In the Tisso II water treatment plant it was clear that we had to understand microorganisms to be able to design a water treatment system without chlorine. The idea of chlorine in drinking water is in a sense basically an anti-life choice, where low-grade poison is added to the basic source of life to avoid bacteria.

What we understood during the Tisso II project was that bacteria played an important role in the water treatment process (sand filtration) and second, by creating a situation where the amount of nutrition for bacteria was removed it became possible to keep unwanted bacteria from the system without the use of chlorine.

However, this inclusion of biological solutions and learning from nature can be taken much further from here. New concepts such as biomimetic membranes using aquaporin molecules similar to those in cell membranes and the development of

sensors for detecting harmful bacteria by means of DNA sequencing methods signals a new world. In this new world operation can become more precise and flexible and hence avoid making the system 'over-safe' as in the case with chlorine. Other emerging scientific options are quorum sensing. The way that microorganisms communicate is believed to increase our knowledge of how to improve the beneficial circumstances for microorganisms, the use of enzymes to tackle difficult substances in water provides new possibilities, the use of microalgae for wastewater treatment makes the process regenerative rather than consuming.

The inspiration from the biomimicry movement is promising. According to the inventor of the term 'Biomimicry', [Janine M. Benyus \(2002\)](#), the nine basic principles of biomimicry are:

- (1) Nature runs on sunlight
- (2) Nature uses only the energy it needs
- (3) Nature fits form to function
- (4) Nature recycles everything
- (5) Nature rewards cooperation
- (6) Nature banks on diversity
- (7) Nature demands local expertise
- (8) Nature curbs excesses from within
- (9) Nature taps the power of limits

Wetlands is an example of an ecosystem that has been used as inspiration for a number of different inventions. Based on the study of wetlands biomimicry solutions for ecosystem solutions, filtering technologies, desalination, flow technologies and surface protection were identified ([Water Research Commission, 2013](#)).

(2) Understanding of eco-system requirements

The understanding of eco-systems requirements for survival thriving is deepening. During the 1980s and 1990s, the understanding of the nutrients nitrogen and phosphorous became well understood and legislation was implemented accordingly. Making the wastewater systems live up to this new knowledge took several decades. But still many places in the world have not reached that level yet. In the last decade, the understanding of other substances in water has made the alarm bells ring: pesticides, persistent organic pollutants (POPs), herbicides, pharmaceuticals, antibiotics, high production volume chemicals, heavy metals, emerging pathogens, endocrine substances, microplastics etc. These are all substances that have been used in society for decades but are now accumulating to a point where their effect on the health of the aquatic ecosystems is threatening and hence also becomes threatening for our human health situation.

Ecology and the deepening of the ecological understanding is one key to the recent incline in popularity of the concept of sustainability. The new insights into

the life of trees and their underground collaborative communication network of mycelium spurs a new research interest and appreciation of the intricacy of our biodiverse surroundings.

An interesting recent development is the granting of legal personhood to rivers. Now the rivers Whanganui River in New Zealand, Ganges and Yamuna Rivers in India, Vilcacamba River in Ecuador and Atrato River in Columbia have been granted some legal protection as if they were humans. This is a promising way of ensuring 'water stewardship'. By this method the rights of rivers are codified, putting an end to the rights to over-exploit them by private companies or through public permits. Similar 'personhood' rights are considered for trees, forests and other natural entities. This may be an improved way of protecting natural reserves. An alternative future approach may entail an 'ombudsman for water'.

(3) The smart revolution of digitalisation

The revolution of, for example, Smart Water Utilities, has taken place since the invention and proliferation of computers since the 1970s and 1980s. The development speed in those decades is amazing. In a sense, it is building a new layer of intelligence on top of the existing steel and concrete systems for water and wastewater treatment, distribution and collection. The development of this new level of intelligence is rooted in a number of inventions:

- Instrumentation, sensors and actuators
- Sensor validation
- Monitoring and data validation
- Telemetry and communications
- Data and information management
- Process control
- Standardisation of protocols
- Modelling of the network, treatment systems
- Etc.

Today the concepts of digital twins, Big data and industry 4.0, are key issues:

Digital twin: the idea that the urban water cycle is mirrored digitally. This enables one-to-one modelling and scenario testing, systematic and comprehensive maintenance management systems and running design optimisations of the fully integrated systems.

Big data: The application of the enormous amount of data accrued during operation. This is especially about mathematical algorithms for the identification of high-level patterns in large amounts of data; patterns beyond what can be perceived and identified by human operations.

Industry 4.0: the latest paradigm shift in how industrial systems are designed. Industry 1.0 refers to the beginning of the industrial revolution focused on the use of steam and water power. Industry 2.0 refers to the period where electricity was

key to cutting edge technology. Industry 3.0 was marked by the introduction of computers and especially digitalisation. Industry 4.0 is primarily related to the invention of the internet and mobile devices, internet of things, smart sensors, cloud computing and data visualisation. It is guided by principles of interconnection, transparency and decentralisation – all aspects that are relevant in the ‘new paradigm’ or the new story.

This industry 4.0 concept has not yet found its final form, and the water and wastewater utility industry are not necessarily leading this development. But it affects the industry enormously and has become an aspirational term that water engineers are struggling to give a real effective beneficial form.

When looking at the above examples of changes from the old paradigm to a new one it is clear that neither of the three examples represents a full transformation. They are all tentative attempts and have a strong pioneering quality to them.

Second, there are a number of other areas within water that need to be addressed, and where the change is hardly discernible, for example:

(4) Women in water

Women in water have been a theme for a while. It is a theme in water journals and it has been described as an important aspect of IWRM. Women have a different approach to water, but are still not representing a strong voice. This is not just a matter of the number of women in water engineering. It also has to do with including a more feminine take on water – which both men and woman can. Hence it is also a challenge for women to truly find their voice about water rather than continuing the current ‘masculine’ approach. An inspiring example is listening to the way Indian Philosopher Vandana Shiva argues for a more ecological approach, not just to water but to life on all levels. An example of this is her nine rules for water democracy, where she couples the usage of water with natural principles and principles of fairness and democracy (Shiva, 2007):

- (1) Water is a gift of nature: We receive water gratuitously from nature. It is our duty towards nature to use this gift according to our needs and sustenance, keep it clean and in adequate quantity. The deviations which create arid or flooded regions violate the principle of ecological democracy.
- (2) Water is essential to life, water is the source of life for all species: all the species and all the eco-systems have the right to their share of water on the planet.
- (3) Life is interconnected by means of water: water connects all human beings and every part of the planet through its cycle. We all have the duty to ensure that our actions do not provoke damages to other species and to other persons.
- (4) Water must be gratuitous for the needs of sustenance. Since nature grants us the gratuitous use of water, to buy or to sell it in order to make a profit, violates our inner right to the gift of nature and detracts from the poor their human rights.
- (5) Water is limited and subject to exhaustion. Water is limited and can be exhausted when used in a non-sustainable manner. To draw more water from the eco-cistern

than nature can furnish is an unsustainable way of using water and consuming more than one's own legitimate share, since other's have the right to a fair share.

- (6) Water must be preserved: Everyone has the duty to preserve water and to use it in a sustainable manner with the sustainable and just limits.
- (7) Water is a common good: Water is not a human invention. It cannot be confined and it has no confines. It is by nature a common good. It cannot be possessed as private property and sold as merchandise.
- (8) No one has the right to destroy it: No one has the right to make excessive use, abuse, waste or pollute the system of circulation of water. The permits of commercially allowed pollution violate the principle of just and sustainable use of water.
- (9) Water is not substitutable: Water is intrinsically different from other resources and products. It cannot be treated as merchandise.

Vandana Shiva

(5) Flexibility in infrastructure design

Most water infrastructure designs are made too large and inflexible – often on multiple levels: for example, capacity of plants often is much larger than needed, individual components such as pumps and compressors which tend to operate far away from optimum and are difficult to regulate or the relevant range and the variable range doesn't fit, because they are chosen for the extreme case. When the system is designed with some flexibility, the provided flexibility is often not used correctly because of lack of control competence.

A silently emerging trend is the use of smaller water treatment units, that fit into truck containers. Containerised solutions will, over time, reach a maturity level that provides an option of more flexible increasing and decreasing capacity. The containers enable water providers to expand and decrease capacity as demand changes. Also smaller household units are emerging for houses and apartment buildings. Still, when looking at the multiple solutions found in nature, I imagine even more flexible solutions can be developed – a recent example is machines for harvesting atmospheric vapour from the air.

These are just some of many areas of our engagement with water needs to or about to change. These are truly interesting times – but it also requires something of all of us to make these changes happen.

Your reflections: Do you see any of these 'trends' play out in your work? How do you practically engage with these new trends? What emerging trends can you identify besides the above that are important in your work?