Third Wave Water

WHITE PAPER

The Importance of Calibrated Water

Unlocking the True Potential of Coffee Cupping

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Third Wave Water

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Abstract

This white paper highlights the transformative effects of using a calibrated water profile, specifically Third Wave Water's (TWW) Espresso Profile, during the coffee cupping process. Based on the research conducted by Third Wave Water and Juan Ángel Welchez, and the shared experiences from Benjamin Carlson, Alex Pond and more, we explore the profound impact that utilizing the correct water profile can have on coffee quality, pricing, and the overall prosperity of coffee farmers. The findings also highlight the significance of using a specific target within the defined SCA (Specialty Coffee Association) water profile ranges to further reduce confusion and variability within the coffee supply chain. This provides a higher fidelity of information throughout the entire coffee ecosystem while also helping coffee farmers increase their cupping scores boosting their overall prosperity.

Third Wave Water

Introduction

Let's Talk Coffee®

There are many complex and intricate factors that contribute to the quality of coffee. Among these factors, water—often an overlooked component—plays a crucial role in the cupping process, where coffee is evaluated for its sensory attributes and overall quality.

This past February, Third Wave Water visited Honduras for Sustainable Harvest's event 'Let's Talk Coffee ®,' and discovered a surprise. Many coffee farmers and cupping labs in Honduras rely on empty water (distilled water) or uncalibrated water for cupping their coffees. This practice leads to a significant discrepancy between the actual quality of the coffee and its perceived quality due to the negative impact of using the incorrect water on cupping scores.

Using empty water to cup coffees is practiced by many cupping farms and coffee labs around the world. After returning from Honduras, we spoke with many more of our coffee partners in Mexico, Burundi, and throughout the coffee belt and discovered that this issue is sadly not isolated to Honduras. This practice of using distilled water may have started because of the need for safe drinking water to provide safe and pure water for cupping and possibly continues to be used for cupping, because of the lack of resources and confusion related to creating calibrated water.

Today there is finally an easy-to-use solution to create calibrated water anywhere in the world, and its implementation into your cupping protocols will help you more accurately understand the value of the coffee and help farmers receive the value they deserve from their efforts.

Cupping Coffee with Drinking Water

One of the first issues that coffee labs at origin face is the difficulty of getting drinking water *(Harrison & Abby Arndt, 2023)*. About 75% of Central America has access to healthy drinking water, compared to 68% of African countries *(Balde, 2022)*. If the coffee labs have issues acquiring healthy drinking water, then acquiring calibrated water engineered for coffee will be even more difficult. What are their options?

The first option is cupping coffee with local water, but this can be dangerous at origin and will greatly vary in water quality. The danger exists because of introducing unhealthy organics or bacteria into your cupping protocols from the local water supply. And the quality of your local water varies from region to region throughout the world because groundwater mineral contents vary. The United States easily demonstrates that the water varies greatly from one side of the country to the other (Refer to Figure 1), by comparing one variable like hardness, let alone the many variables that are represented in water.

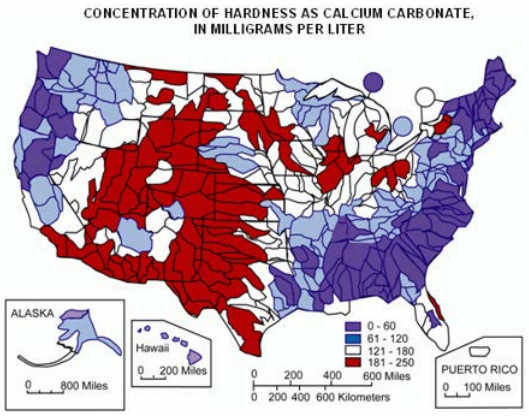

Figure 1: Map of water hardness varies throughout the United States *(Water Resources Mission Area, 1975)*

The second option is to filter the local water for health reasons, which can also reduce variability. But how do you reduce variability when your customer lives on the other side of the planet? Coffee sellers and buyers are typically not located in the same country, let alone the same coffee lab, when performing cuppings to grade coffee. This was the initial advantage of using empty water.

Cupping Coffee with Empty Water

Empty water is any water that does not contain minerals, chemicals or organics. The three most common methods to create empty water are reverse osmosis, deionization and distillation. Minerals are naturally present in water due to rain and the mineral content of the local aquifers (Refer to figure 1). Chemicals are typically added to protect water's journey from unhealthy organics as it travels from the local water municipality through pipes arriving safely to your house. This can include chloramine or chlorine. And organics can include a variety of items, but are mostly unhealthy that could include bacteria or even viruses.

> **Empty water is any water that does not contain minerals, chemicals or organics**

Empty water was used to support uniformity of tasting notes between the seller and buyer, regardless of their location when cupping coffee. Using the same water to cup coffees greatly lowers communication barriers, so you can have the same experience no matter your location.

Empty water was also an effective tool for cupping at origin because of its availability in comparison to calibrated water. Many Central American coffee labs have the ability to get empty water delivered in 5-gallon or 19-liter jugs to help bypass drinking dangerous water from the faucet. And some coffee labs at origin even create empty water themselves by distilling the water, which kills unhealthy organics and separates the water from minerals and chemicals. Regardless, trying to create calibrated water is costly when installing a plumbed-in water system.

Even though empty water had some initial advantages, it sadly fails at helping coffee taste its best. According to Christopher Hendon in his book Water for Coffee, "It is often (correctly) cited that you need some mineral content in brewing water, which is why distilled or deionised waters do not produce great cups of coffee" *(Hendon & Colonna-Dashwood, 2015)*.

> **distilled or deionised waters do not produce great cups of coffee**

This sentiment is repeated in The SCA (Specialty Coffee Association) Water Quality Handbook stating, "Higher total hardness is assumed to increase extraction efficiency" *(Wellinger, Smrke, & Yeretzian, 2018)*. And World Barista Championship winners like Pete Licata (2013) also agree. In his book How to Get the Best from Your Coffee he explains, "When it comes to what's in our water, we know we need a small amount of dissolved mineral solids – without them, our brews are off-balance and unpredictable" *(Licata, 2019, p. 19)*. Empty water does not produce great cups of coffee, but why?

The two primary reasons empty water fails to help coffee taste its best are due to the lack of extraction and because of its inability to buffer acids. The lack of extraction is greatly influenced by the brewing time of coffee. In his book Coffee Technology, coffee pioneer Michael Sivetz performed a test comparing coffee brewed with distilled water and sodium bicarbonate (NaHCO3). He explained that, "test results showed that when bicarbonates were 300 ppm (parts per million) or higher, drip-through time was longer" *(Sivetz, 1979, p. 646)*. How much longer?

In Michael's tests, deionized water's brew time was 6 minutes, and the 300 ppm NaHCO3 (Sodium Bicarbonate) was almost 9 minutes in comparison. Adding minerals increased the brew time by 50 percent! Adding 300 ppm is not recommended, but the test results explain brew time differences between these two types of water. Also, the coffee batch size is irrelevant for his tests as he probably exaggerated the amount of coffee to more easily measure the effects of the two different waters. In addition, he adds, "Further, removing water hardness with substitution of sodium ions for calcium or magnesium ions increased the drip-through time 50 percent."

Why is the speed of your brew time important? Because the water brewing time is directly connected to the ability of the coffee oils to transfer to the water through the limitations of diffusion, and diffusion provides opportunity for extraction. Also, changing the grind settings to change your brew times will not fully correct the lack of ability of diffusion in distilled water.

The second reason empty water fails is because of its inability to inhibit acids. Christopher Hendon explains, "It turns out we do need some magnitude of buffer. Very soft - or empty - waters often result in brewed coffee that displays a vinegary and slightly sour acidity as the pH of the result- ant liquid (cup of coffee) has dropped significantly: A small amount of buffer could have kept this in check" *(Hendon & Colonna-Dashwood, 2015, p. 94)*. Adding some buffer helps coffee avoid some negative flavors.

Similar to the negative effects of having no buffer in your water, adding too much buffer in your water will also destroy a coffee's flavor. Too much buffer will wipe out the acidity in the cup of coffee and therein lies the secret; acidity.

> **Therein lies the secret; acidity**

A buffer resists pH changes when exposed to acids and bases, like coffee, which is acidic *(Pietri & Land, 2020)*. Even if the coffee flavors are present in the coffee, they cannot be perceived by the taste receptors of the individual if the acidity is largely diminished with an overly strong buffer. This is why coffee flavors can be greatly lost when using some waters, because an overly strong buffer is destroying the acidity. Imagine drinking orange juice with no acidity, the flavors of the orange juice would be completely flattened.

To summarize our findings (refer to table 1):

- Drinking water is more available, but has the most variability and least likelihood in helping coffee taste its best.
- Empty water is a great solution over drinking water for coffee, but still flattens many coffee flavors and can also add negative vinegary or sour flavor notes.
- Natural acidity in coffees can be destroyed by too much buffer, but some buffer helps avoid sourness.

	PRO	CON
DRINKING WATER	Available in more areas than empty water.	Can flatten acidity due to too much buffer. Highest range of variability. Can be dangerous to drink in many counties in the coffee belt.
EMPTY WATER	Enables healthy communication for tasting notes regardless of location. More accessible than calibrated water.	Flattens coffee flavors by extraction. Speeds up brew times reducing diffusion.

Table 1: Water Options 1 and 2 for Cupping Coffee

Here are two important questions before we continue:

01 What kind of water increases extraction efficiency and achieves a balanced buffer for coffee?

02 And if empty water does not produce great results for coffee, how much value is being lost for the coffee farmer that uses drinking water or empty water to cup their coffees for scoring?

The answer to the second question is investigated more fully in Case Study No. 1 where we discovered that there is more value lost than initially thought. And the answer to the first question is calibrated water, which will now be explained in the next chapter.

The Brief History of Water for Coffee

The road to creating a calibrated water profile seems to have officially begun in 2001 when the SCAA (Specialty Coffee Association of America) recognized water was creating consistency issues for the coffee supply chain and created a Water for Brewing Specialty Coffee Water Standard *(Specialty Coffee Association of America, 2009)*. This standard was later updated in 2009 (Refer to Table 3). Then in 2011 they created The Water Quality Handbook *(Beeman, Songer, & Lingle, 2011)* to, "meet the high standards required for proper extraction of the flavors and aromas inherent in a Golden Cup." The Golden Cup was the SCAA's certification of high-quality, freshly brewed coffee.

Their water research grew beyond the Golden Cup in 2013 when they formed a Water Quality Committee, consisting of industry professionals and experts in coffee science. Their objective was to study the impact of water on coffee brewing and cupping. Emma Sage summarized many of their conclusions in her article 'Dissecting SCAA's Water Quality Standard' *(Sage, 2013)*.

Soon the conversation about water for coffee began to grow and spread throughout the specialty coffee industry. In 2015 Matt Perger created Barista Hustle *(Perger, 2019)*, sharing his water formulas and Christopher Hendon and Maxwell Colonna-Dashwood published their book Water for Coffee.

Shortly after in July 2016, Fresh Cup Magazine released a special edition focusing on water. It was here that Phil Robertson's (Phil & Sebastian Coffee) shared a story in his article 'Correct Coffee, Wrong Water' discovering that, "roasters roast to their own water, whether they realize it or not" *(Robertson, 2016, pp. 42-44)*. Michael Butterworth in his article 'Water, (Different) Water Everywhere' also explained his difficulties when trying to brew at a coffee competition replicating the flavor profile he had, "fallen in love with in his coffee lab" *(Butterworth, 2016, pp. 48-50)*. The water issues were finally being shared publicly by coffee professionals; this is the year that we launched Third Wave Water in SCA's event Bloom, in Chicago.

The next year, in 2017, the SCAA merged with the Specialty Coffee Association of Europe to become the Specialty Coffee Association (SCA). Then in 2018, the SCA released The SCA Water Quality Handbook. This booklet defines a specific range of water characteristics now used by many coffee professionals, as the authors of the SCA booklet sought to, "establish a solid scientific framework for a unified and transparent consensus on how we measure, aim and treat water for coffee" *(Wellinger, Smrke, & Yeretzian, 2018)*.

The SCA water profile considers the optimal mineral content, pH level, and other key characteristics necessary for consistent and accurate cupping evaluations (Refer to Table 3). By adopting the SCA water profile, coffee professionals can establish a standardized baseline with many advantages:

- Enhanced Flavor Profiling: Allows the full expression of coffee flavors, enabling cuppers to identify subtle nuances and distinct characteristics accurately.
- Accurate Quality Assessment: Cuppers can provide more reliable and consistent cupping scores, facilitating fair trade and market valuation.
- Improved Consistency: Ensures that cupping results are not influenced by variations in water quality, leading to more reliable and repeatable evaluations.

Today, the Coffee Quality Institute's (CQI)'s Q-grader certification requires coffee personnel to be in calibration in order to cup coffee. And in order to be 'in calibration,' you need to be re-tested every three years. CQI uses the SCA water standard defined in the SCA water Protocols for Cupping *(Coffee Quality Institute, 2022)*. For this purpose, we define **calibrated water** is a water that meets the series of ranges within the SCA water standard as defined in the SCA Water Quality Handbook. Therefore, water used for cupping for personnel that are in calibration is considered calibrated water (Refer to Table 3). The term calibrated water is not directly connected to CQI, but is the term used here in order to help with clarity as we discuss this complicated topic.

> **Calibrated water is a water that meets the series of ranges within the SCA water standard**

To summarize our findings (Refer to Table 2):

- The SCA water profile defines a range of criteria that helps coffee professionals better communicate about coffee.
- The SCA water profile is used to define the parameters for calibrated water.
- Calibrated water is difficult and expensive to create using plumbed in water systems today, especially at coffee labs at origin and is therefore not widely available.

	PRO	CON
DRINKING WATER	Available in more areas than empty water.	Can flatten acidity due to too much buffer. Highest range of variability. Can be dangerous to drink in many counties in the coffee belt.
EMPTY WATER	Enables healthy communication for tasting notes regardless of location. More accessible than calibrated water.	Flattens coffee flavors by extraction. Speeds up brew times reducing diffusion.
CALIBRATED WATER	Meets ranges for water engineered for coffee.	Difficult to acquire or create in many cupping labs at origin throughout the coffee belt.

Table 2: Water Options 1, 2 & 3 for Cupping Coffee

Even though calibrated water provides healthy ranges for water for coffee, this is sadly not enough to reduce many communication issues and more accurately grade coffee irrespective of location. This is because different locations grading coffee can still be on opposite sides of the SCA water ranges. And creating calibrated water with plumbed-in systems is expensive and nearly impossible to duplicate in different locations. Then what is the option for water for coffee in different locations?

Figure 2: Three Sizes, 2 Liter, 1 Gallon and 5 Gallon

The Most Effective Option

What is the most effective option to get great water for coffee? James Hoffman begins our answer by explaining, "If your water is a long way from where you want it to be, then you have a more extreme solution: strip everything from the water and remineralize it" *(Hoffmann, 2022, p. 47)*. The water throughout the coffee belt is a long way from where we want it to be, so our solutions are going to be extreme in order to create a desired calibrated water profile anywhere in the world. Just use the same easy, duplicable process everywhere and avoid any of the other potential variations or contaminants.

Therefore, the first step is to strip the water of everything, which includes minerals, chemicals, and organics. And the second step is to mineralize that water with the right minerals in the right ratios that create a calibrated water profile, but there is still one big issue remaining. How do you create the exact same calibrated water profile anywhere in the world? You use the same exact mineral packet that is manufactured for minimal defects and engineered per the SCA water standards. This was the goal of Third Wave Water since the beginning.

Our mission is to provide the best, easy-to-use mineral packets for coffee's many special uses, which includes cupping coffee protocols.

How do we do it?

- Third Wave Water uses pharmaceutical manufacturing techniques to ensure the correct homogeneous mixtures for each formulation.
- Our packaging is engineered to provide long-lasting quality and high solubility.
- There are multiple water profiles for various uses in the coffee industry, which even include dark roasted coffees.
- We provide multiple sizes of mineral packets to match water size containers around the world (Refer to Figure 2).
- Our mineral packets are easy to use anywhere. No additional mixing or formulations are required for optimal water for coffee.
- Our mineral packs are light in weight, reducing shipping costs and impact on the shipping ecosystem. Shipping water is not efficient.

Two Water Profiles, Two Industry Standards

Third Wave Water currently creates two water profiles that meet the requirements for SCA water standards for calibration. The Classic Profile (now called the Classic Light Roast Profile) meets the older SCAA water standards *(SCAA, 2009)* utilizing sodium chloride, while the Espresso Profile does not use sodium chloride and almost doubles the buffer from 40 kH to 70 kH (Refer to Table 3).

	SCAA (older)		SCA			
Characteristic	**Target**	**Acceptable Range**	**Target**	**Acceptable Range**	**Classic (SCAA)**	**Espresso (SCA)**
Odor*	Clean Fresh/ Odor Free		Clean Fresh/ Odor Free		✓	✓
Color*	Clear color		Clear color		✓	✓
Chlorine	None	None	None	None	✓	✓
TDS	150 mg/L	75-250 mg/L	150 mg/L	75-250 mg/L	✓	✓
Alkalinity	40 mg/L	At or near 40	40 ppm	At or near 40-70 CaCO3	✓	✓
pH	7.0	6.5 – 7.5	7.0	6-8	✓	✓
Calcium Hardness	4 grains or 68 mg/L	1-5 grains or 17-85 mg/L	50-175 ppm CaCO3	50-175 ppm CaCO3	✓	✓
Sodium	10 mg/L	At or near 10 mg/L			✓	

*Based on olfactory and visual determinations

Table 3: SCA Water Profiles and Third Wave Water Profiles

The Espresso Profile (now called Espresso Machine Profile) was originally engineered to protect espresso machines, avoiding harmful chlorides, and is our recommended water profile for cupping since it meets the latest SCA water standard *(SCA, 2023)*. It also contains bicarbonates, which has been proven to help create a solid crust when cupping *(Barista Hustle, 2019)*. Many coffee partners like Cup of Excellence (CoE) and Sustainable Harvest choose the Espresso Profile as their preferred water for cupping. Make sure to look for the new Medium Roast Profile to use for cupping protocols, as it utilizes much of the water profile from the original Espresso Profile. This water profile will be released before the end of 2023.

> **Make sure to look for the new Medium Roast Profile to use for cupping protocols**

To summarize our findings (Refer to Table 3 and Table 4):

- Third Wave Water creates two water profiles that are considered calibrated water: the Classic Light Roast Profile, the Espresso Profile (soon the Medium Roast Profile too).
- Third Wave Water manufacturing techniques ensures high quality standards are met.
- Mineral packets are light, easy to use, and are available for each countries' water jug sizes.

	PRO	CON
DRINKING WATER	Available in more areas than empty water.	Can flatten acidity due to too much buffer. Highest range of variability. Can be dangerous to drink in many counties in the coffee belt.
EMPTY WATER	Enables healthy communication for tasting notes regardless of location. More accessible than calibrated water.	Flattens coffee flavors by extraction. Speeds up brew times reducing diffusion.
CALIBRATED WATER	Meets ranges for water engineered for coffee.	Difficult to acquire or create in many cupping labs at origin throughout the coffee belt.
THIRD WAVE WATER ESPRESSO PROFILE (& MEDIUM ROAST PROFILE)	Less variability than calibrated water as it meets a specific target within ranges engineered for coffee. Light weight and easy to ship and use at any location. Compliments cupping labs already using 'empty water.' Special travel water kits are available to use anywhere in the world.	Minerals are difficult to import into some countries.

Table 4: Water Options 1, 2, 3 & 4 for Cupping Coffee

Third Wave Water

Create a Unified Cupping Standard

Now that we have a range defined for water (the SCA water standard, aka **calibrated water**) and a specific target within that range (the TWW Espresso Profile), the next goal is to align your coffee partners with a unified cupping standard.

Coffee is cupped in many different locations around the world throughout the coffee ecosystem before it reaches the final customers. Here are a few examples (see figure 3):

- Coffee Farm
- Coffee Co-op (assists processing coffees)
- Coffee Lab with Importers or Exporters
- Coffee Roaster
- Cafe, Retail or Coffee Education

Creating a unified cupping standard for water across your entire coffee ecosystem will ensure that all organizations involved will have the highest probability of repeating the original experience at coffee lab at origin.

We work with a lot of amazing people in coffee, and are excited to share three case studies that demonstrate using Third Wave Water in real-world scenarios. The first case study will answer the question asked earlier, 'How much value is lost for coffee farmers using uncalibrated water?' The second case study investigates how a farm in Burundi, Africa with an extremely remote location, can still use the TWW calibrated profile successfully. And the third case study explores some of the difficulties when training coffee personnel in various locations throughout the world.

Case Study No. 1: The Coffee Farm with Distilled Water

This case study explores the important unanswered question asked earlier in this white paper, "if empty water does not produce great results for coffee, how much value is being lost for the coffee farmer that uses drinking water or empty water to cup their coffees for scoring?"

This was the question that plagued us the most, and we needed to find an answer.

We already knew that many of the coffee labs in Honduras use empty water for health purposes, so the only remaining step was to re-mineralize that water. This was the perfect environment for our first test, so we partnered with a coffee farmer located in Copan Ruinas, Honduras: Juan Angel Welchez.

Welchez was a perfect fit for this project with first-hand experience as a Honduran coffee farmer and a wall of coffee related degrees including an MBA + Master in Supply Chain, Masters Degree in Agronomy and Crop Science, BSc of Agricultural engineering and more.

He acquired four coffees for a cupping comparison using the Third Wave Water Espresso Profile and their typical local filtered 'empty' water. This was the typical water used by most local Honduras cupping labs and farms to cup their coffees. He also made sure to choose a variety of quality coffees from Cup of Excellence (CoE) winners to more average scoring specialty coffees from Honduras to verify if there are any prevalent differences between them.

Figure 3: Unified Cupping Standard

	TYPE	ORIGIN
COFFEE 1	A natural processed Geisha	Finca: La Salsa, Honduras, Benjamin Paz
COFFEE 2	A washed Copan blend	Copan, Honduras, Juan Welchez
COFFEE 3	A Honduras blend	From the mountains of El Merendon in Cortes, Honduras, David Hernandez, Mythoz Coffee
COFFEE 4	A Honey process Parainema	Finca: San Rafael, Carlos Rene Guerra

Table 5: The Four Coffees

Juan assembled a dream team including Raul Moreno and Carlos Rene Guerra to cup and score the four coffees. Raul is a lead cupper at the Cup of Excellence (CoE) farm La Salsa (Benjamin Paz) and Carlos is a two-time Barista champion (2019 and 2020 in Honduras) and operator at Café San Rafael in Copan Ruinas, Honduras. Juan's team used the Tastify application to quickly aggregate the final scores. See appendix A for the full Tastify scores:

	DISTILLED WATER	TWW ESPRESSO PROFILE WATER	DIFFERENCE
COFFEE 1	88.5	89.5	+1
COFFEE 2	80.37	81.5	+1.13
COFFEE 3	81	82.37	+1.37
COFFEE 4	83.12	84.37	+1.25

Table 6: Cupping Scores by Juan Welchez's Team

After his research, Juan wrote a summary of his findings. Instead of paraphrasing his summary, it made the most sense to include it in this paper so you could read his discoveries yourself.

Figure 4: Cupping by Raul Moreno (left) and Carlos Rene Guerra (right)

A Personal Perspective

As a Honduran farmer with over nine years in the industry, I have first-hand experience with the tremendous influence that small changes can bring to coffee quality, and subsequently, pricing. I have seen coffees that are typically rated 80-81 sell for a certain price, those rated 82-83 slightly better, and so forth, with the best prices reserved for those exceeding an 86 rating.

However, the fascinating aspect, which was revealed by this research, is that a coffee rated as 81 could be perceived as an 82, or an 83 could rise to an 84, just by using the correct water profile - in this case, TWW's espresso profile. This seemingly insignificant rise of a single point could increase the price per pound by a few cents. While this might seem trivial, it's quite the opposite for us farmers - every single cent counts.

This is especially true for us in Honduras, where most of our coffee tends to fall within the 80-83 score range. By adopting TWW's water, we could potentially start to see a slight, but significant, increase in the perceived quality, and hence, the price of Honduran coffee. Bit by bit, every cent added will contribute towards a stronger coffee industry and a more prosperous future for farmers like us.

Importantly, we are not talking about "cheating" or using artificial flavor enhancers to achieve these results. This improvement is solely down to using water with minerals that fall within the standards of the Specialty Coffee Association (SCA). This process essentially levels the playing field for us farmers, enabling us to compete fairly on the global market.

This research has reiterated a truth that often goes unnoticed - every single element in the coffee production chain, even as basic as water, can impact the final quality and value of the coffee. For us farmers, this knowledge is not only enlightening but also empowering. It gives us hope that through continuous learning, innovation, and adaptation, we can grow better coffee, obtain fairer prices, and ultimately, lead a better life.

Drawing from the words of the top cupper at La Salsa Coffee Farm [Raul Morena]: as we savored the natural process Geisha, last year's CoE winner, he said with a touch of surprise, "I honestly thought this coffee was as good as it gets. But just changing the water? Who knew something so simple could make such a difference? It just goes to show, there's always room for improvement, even with the best of the best."

In conclusion, the research conducted by TWW in Honduras unequivocally demonstrates the importance of using the correct water, specifically TWW's espresso profile, for cupping and scoring coffee. This knowledge is a game-changer for coffee producers, not only in Honduras but across coffee-growing regions. By embracing this understanding and implementing TWW's solution, coffee producers can elevate the quality and value of their coffees, secure fairer prices, and contribute to the advancement of the global coffee industry as a whole.

- Juan Welchez

The first reassurance after seeing his results is that they were consistent. The scores did not flip back and forth to the distilled water winning in any comparison. All of the coffees scored higher with the TWW Espresso Profile.

> **All of the coffees scored higher with the TWW Espresso Profile**

The second reassurance was to see how much higher the scores were with the coffees cupped with a calibration water profile. We did not know how close the scores would be to one another. Would it be a quarter point difference? Maybe a half point? But an entire point difference?

It is obvious a higher score will provide a higher price, and this is still valuable even if it is just a few extra cents per pound. Juan explained, "every cent added will contribute towards a stronger coffee industry and a more prosperous future for farmers like us." So many people in the coffee industry are working diligently to provide a fair price. Making sure that we use the right calibrated water profile will help support this mission even more and help roasters discover coffees they may have otherwise avoided to purchase, as we will see demonstrated in the next case study.

All of the coffees scored higher with calibrated water, even the best coffees saw a considerable jump in value. Raul Morena explained, "I honestly thought this coffee was as good as it gets. But just changing the water? Who knew something so simple could make such a difference? It just goes to show, there's always room for improvement, even with the best of the best." We were humbled by the results, but like all great tests, you do not stop experimentation there.

We decided to duplicate the tests with our in-house Q grader, Andrea Costa. She led a small team repeating the tests with the help from Ana Mallozzi (Q Grader from Covoya Coffee) and Brita Gustafson (Training & Education at New Harvest Coffee). They used the SCA cupping protocols, performing the same comparison, and their results were equally impressive. We wanted to validate the same findings:

- Calibrated water versus distilled water provides significantly higher scores for all of the coffees.

Figure 5: Cupping by Andrea Costa (left) and Ana Mallozzi (right)

Similar to Juan's tests, our first reassurance was that all of the scores improved on the correct side of the table (Refer to Table 7). And the second reassurance was also similar in that the scores were significantly higher. The difference of a 79.5 to an 80.1 is the entrance into specialty coffee, which would make all the difference in the world for a coffee farmer.

Andrea's team recorded an average jump of 0.625 points across all coffees, validating a significant change. This is about half of the difference measured with Juan's team, but that might be attributed to the coffee being separated by 30 days from roast and mixed shipping conditions. Juan's team cupped the coffee within a week of roast and since we did not have a Roest sample roaster, we relied on receiving the coffee already roasted, shipped to our office in America. Refer to Table 7 for their results.

	DISTILLED	TWW ESPRESSO PROFILE	DIFFERENCE
COFFEE 1	86.75	87.25	+0.5
COFFEE 2	82	82.75	+0.75
COFFEE 3	82.5	83.25	+0.75
COFFEE 4	84	84.5	+0.5

Table 7: Cupping Scores by Andrea's Team

Key Lessons

01 Using Third Wave Water's calibrated water profile (Espresso/ Medium Profile) significantly improves cupping scores over distilled water.

02 All quality variations of coffee, from lower scoring to higher scoring, benefit from using a calibrated water profile.

03 Improved cupping scores are important to coffee farmers to improve their way of life.

Third Wave Water is providing 100 coffee sponsorships this year! Please submit your coffee farm, coffee lab or coffee education center for a sponsorship of minerals to try our calibrated water profile in your coffee cupping:

https://thirdwavewater.typeform.com/farm-english

https://thirdwavewater.typeform.com/farm-spanish

Case Study No. 2: The Coffee Farm in Remote Locations

In 2011, founders Ben and Kristy Carlson moved to Burundi and observed both injustice and poor farming practices in the country's newly privatized coffee industry. Recognizing the challenges roasters faced in obtaining consistently great coffees from Burundi, they founded Long Miles Coffee to foster positive change in the lives of both farmers and roasters. Long Miles Coffee operates as a farmer-driven production model, emphasizing a combined effort that considers the needs of coffee farmers and global roasters alike. With this approach, they have grown from working with just fifty farmers in their first season to partnering with over 5,500 coffee farming families across eleven unique hills in Burundi, and they are expanding into Uganda and Kenya *(Long Miles Coffee, 2023)*.

Long Miles Coffee is committed to creating traceable micro-lots that yield consistently exceptional coffees while simultaneously improving the livelihoods of the smallholding farmers who cultivate them. Key to this mission is the twenty-six Long Miles Coffee Scouts, well-trained junior agronomists who provide year-round agricultural assistance to farmers. The company is dedicated to fair compensation, paying higher prices for coffee cherries and offering annual premiums to farmers. Furthermore, Long Miles Coffee prioritizes strengthening the relationships between roasters and farmers, encouraging long-term partnerships that allow roasters to serve coffee from specific hills year after year.

Third Wave Water reached out to Ben Carlson in 2020 to offer a prototype, portable water filtration system, to help with their efforts in remote farm locations. Ben accepted the prototype and tested them at origin. This year he kindly shared his experience with the portable water kit and the results were astounding.

Here is his story.

Figure 6: Long Miles Coffee (photo credits @longmilesben)

Long Miles Coffee

Long Miles Coffee (LMC) is dedicated to quality and impact. In fact, Impact is one of the bottom lines of our company. We created a Coffee Scout Program that develops young people from the hills we work in, who have graduated from high school, but cannot access university. We hire them as fulltime agricultural assistants to work alongside our Agronomists to train, teach and work alongside the thousands of farmers that we partner with at Long Miles Coffee.

The impact is palpable, something we had hoped would be the case but in reality, to see yields go up 4x on Coffee and 5x on Banana and creation of kitchen gardens that have helped to create food security in thousands of families lives. What we didn't anticipate is the impact we would have on coffee quality.

We started LMC when I first did a consulting trip into Burundi in 2009 shortly after the privatization of the coffee sector. It was on that trip that the potential of the coffee in Burundi jumped out at me. By 2013 we had started our first washing station and were working with the first 180 families. We quickly realized that the coffee was a baseline 84 points. To be in specialty coffee and really to realize our vision of being one of Africa, and the world's best coffee producers, that we needed to have our coffee scoring 87+ on a consistent and repeatable and scalable basis.

By 2015 we felt we had a system and a team built that would help us reach this 87+ consistent goal. By 2020 we were working with nearly every roaster that we had seen would really highlight our coffee as one of the world's best and that long winding intro is when Third Wave Water entered the picture.

After three down years of production, 2021 arrived and our Burundi coffee finally had a bumper crop. We saw the efforts of 10 years of the Coffee Scout Program pay off in our cherry selection and harvest. Early cupping indicated that this would be consistently one of our finest quality offerings we had presented.

One of our roasters visited us on a buying visit to Burundi. We set the cupping table with dozens of our best micro lots; these lots were consistently scoring 88+. As we went around the table there was little talking and at the end of the first session, we all felt let down. While clean and with lots of flavor, the coffee was muted with little of our characteristic brightness. Solid 85-86 scoring is not bad, but we are not looking for "not too bad." We are looking for exceptional. Sometimes you just get a table like that. You can't win them all.

When the second table had the same results, I knew we had a problem. The roaster was confused too as he knew that our characteristic acidity and popping complexity was missing. We went through what could be wrong and in the process; we looked back through the cupping protocols and found that the lab tech had used tap water for the cupping and not put the water through the new Third Wave Water filtering process. We re-set the first table with the same exact coffee, used the Third Wave Water kit and cupped through the lots again.

The table of 85-86 scoring lots just jumped off the table. What we knew was hiding in the cup was there. We found 87, 88 and 89 scoring micro lots. The coffee roaster left buying more coffee than ever and to this day, they make sure to tease me on my water use.

With the Third Wave Water kit we know we will have three things: consistency across all our cupping throughout the season, the ability to truly taste a specific micro lot for what its characteristics are without any variables (helped with using our Ikawa with a set roast profile), and we have seen a minimum of 1 point and up to 3 points higher cupping scores between regular water and Third Wave Water.

- Ben Carlson

Ben's vision to start a pilot program, hiring students into careers grounding them for a real future is not only brilliant, but humbling. His organization fought for 10 years with their Coffee Scout Program waiting for the positive results to appear and eventually it paid off. Their trained personnel would soon experiment with the Third Wave Water's portable deionization kit to remove all of the minerals from their potable water and then just add in the right minerals to create a calibrated water for cupping. In this case, Ben was using the Espresso Profile as the calibrated water.

> **we have seen a minimum of 1 point up to 3 points higher cupping scores**

The Long Miles Coffee team saved a lot of value for their farmers over the years using Third Wave Water's calibrated water profile. As Ben explained, "we have seen a minimum of 1 point and up to 3 points higher cupping scores between regular water and Third Wave Water." They could see up to 3 points in difference because the water was fighting their coffee's flavor.

Remember the buffer water issue we discussed earlier? Most likely, in the cases of jumping 3 points higher in score, they were accidentally using a water with a strong buffer, which then crushes acidity and many of the desired flavor notes. But thankfully they were able to identify the issue and easily correct it to help their customers experience the real value in the cup, as his final story demonstrated.

This portable water kit is engineered for easy assembly and maintenance and removes unhealthy organics, chemicals, and minerals to create an empty base. We recommend using it with potable drinking water for best results.

Key Lessons

01 **Consistency is important for cupping coffee at the coffee farm.**

02 **Long Miles Coffee was able to protect the hard efforts put into the coffee benefiting both the buyer and the coffee farmer by using the Third Wave Water calibrated water profile.**

If you are interested in learning more about the Portable Water Kit please apply for a wholesale account (See the 'More Information' section on page 23) and visit:

https://wholesale.thirdwavewater.com/products/portable-water-kit

Third Wave Water

Case Study No. 3: Coffee Education

Coffee educators' challenges can be similar to coffee farmers': to achieve repeatable outcomes with reliable processes. Coffee educators' goals are to successfully teach a curriculum, transferring as much knowledge as possible to their students. But what happens when your goal is to discuss coffee tasting notes, and the students are not located in the same country? This is the unique challenge that Alex Pond faces while managing education for the Cup of Excellence®.

The Cup of Excellence (CoE) is a prestigious international organization that identifies, rewards, and promotes exceptional coffee farmers around the world. Established in 1999, CoE is committed to promoting transparency, sustainability, and excellence in the coffee industry. Through rigorous competitions held in various coffee-producing countries, a panel of national and international judges conducts multiple rounds of blind tastings, evaluating coffees based on attributes such as flavor, aroma, acidity, body, and balance, setting a global standard for coffee quality.

Winning the CoE competition brings farmers significant recognition and often leads to higher prices for their coffee, transforming the lives of farmers and their communities. The CoE's global reach celebrates the unique characteristics of coffees from different regions, from Latin America to Africa and Asia.

Beyond the competition, CoE is dedicated to education and training, offering best practices for local producers and educating consumers and professionals about coffee tasting and appreciation. The organization also features a unique auction system, where winning coffees are sold in international online auctions to specialty coffee roasters, fostering a direct connection between farmers and buyers and reinforcing CoE's commitment to integrity and transparency *(Cup of Excellence, 2023)*.

The CoE is well known for their auction lots throughout the world, but it has been an uphill battle with variability that plagued their training. In order to maintain their high standards of excellence, coffee education is a very important aspect of their organization. Alex explains, "As a cupper, it is important to have water that you understand and that is consistent. When the Cup of Excellence was developing our global cupping classes during the pandemic Third Wave was the obvious choice as a partner. Third Wave Water allowed us to send coffee to hundreds of studies globally and for each student to cup using the exact same water."

Alex continues, "Eliminating the variable of water differences from country to country and city to city allowed us to gather more accurate cupping data from each student. In turn, providing students the data on their cupping ability they have come to rely on us for. This is why we continue to use Third Wave Water for all of our remote educational efforts."

> **Eliminating the variable of water differences from country to country and city to city allowed us to gather more accurate cupping data from each student**

It is important to use a calibrated water profile, whether you are cupping coffee in a classroom setting or remotely across thousands of miles. Increasing the comprehensiveness of someone's coffee education has been a benefit we could have only dreamed of in the beginning of Third Wave Water. We are honored to partner with Cup of Excellence in their coffee training programs and are excited to help other coffee educators share their passion with reliable tools, like Third Wave Water's calibrated water profile, the Espresso Profile (Medium Roast Profile).

Key Lessons

01 **Water consistency is important when training. Eliminate as many variables as possible.**

02 **Third Wave Water's minerals enable coffee educators anywhere in the world.**

Figure 7: Cup of Excellence (photo credits: @cupofexcellence Instagram)

If you are an educator and would like more information about using Third Wave Water in your classes then please contact Charles at charles@thirdwavewater.com or sign up for an account and visit here for more information:

https://wholesale.thirdwavewater.com/pages/education

Conclusions

The issue of getting great water for coffee is not new, but finding a real solution for coffee labs at origin is. Our goal with this paper was to validate the dangerous effects of using the wrong waters for cupping coffee and share viable solutions for those scenarios.

Drinking water, while widely available, exhibits significant variability and is least likely to help coffee taste its best. In contrast, empty water, which is devoid of minerals, is a preferable solution over regular drinking water for cupping coffee, but it still flattens many coffee flavors. The balance of acidity and buffer in water is delicate; excessive buffer can destroy acidity in coffee, but a certain level of buffer is necessary to prevent sourness. The Specialty Coffee Association (SCA) water profile played a crucial role by defining a range of criteria that facilitates better communication among coffee professionals and setting the parameters for what constitutes calibrated water.

Creating calibrated water, as per the SCA's guidelines, is a challenging and expensive task, especially when using plumbed-in water systems. This is particularly true at coffee labs located at the origin of the coffee, which is why calibrated water is not widely available. Third Wave Water (TWW) offers two distinct water profiles that meet the criteria for calibrated water: the Classic Profile and the Espresso Profile, which is preferred water profile recommended for cupping coffee since it does not have sodium chloride. All of TWW's minerals are meticulously manufactured to ensure high standards of quality with lightweight, user-friendly packaging, tailored to match many water jug sizes in various countries.

Utilizing Third Wave Water's calibrated water profile has been shown to significantly enhance cupping scores compared to using distilled water. This improvement is observed across all quality variations, from lower to higher scoring coffees. For coffee farmers, these improved cupping scores are more than just numbers; they are a pathway to enhancing their livelihoods as Juan explained.

Consistency is also paramount, whether cupping coffee at a farm, training new baristas, or educating coffee enthusiasts around the world. Long Miles Coffee, for example, was able to safeguard the hard work invested in their people and coffee—benefiting both the buyer and the farmer—by using Third Wave Water's calibrated water profiles. And the Cup of Excellence eliminated their water differences to greatly improve their coffee education.

Ultimately, Third Wave Water's mineral solutions are empowering coffee professionals globally by eliminating water as a variable in the complex equation of coffee cupping and tasting. Whether you are a coffee educator, operating a coffee lab at origin or a coffee farm, make sure to sign up for a Third Wave Water account and discover how we can help:

- Calibrated water profiles (Espresso/Medium) to get your coffee supply chain on the same page.
- Water tools used to verify quality like TDS and pH meters.
- Water pumps and mixing accessories.
- Portable water filtration kits that easily create calibrated water at origin.
- Water education for coffee, make sure to sign up for our quarterly Q&A.

More Information

Contact Charles Nick

Email - charles@thirdwavewater.com

Schedule a call - https://calendly.com/charles-8/30min

Submit your coffee farm for the mineral sponsorship:

https://thirdwavewater.typeform.com/farm-english

https://thirdwavewater.typeform.com/farm-spanish

Apply for a Wholesale Account at Third Wave Water:

https://wholesale.thirdwavewater.com/pages/w

Learn more about the Third Wave Portable Water Kit:

https://wholesale.thirdwavewater.com/products/portable-water-kit

Learn more about our water education for coffee:

https://wholesale.thirdwavewater.com/pages/education

Read more about the Let's Talk Coffee trip to Honduras:

https://thirdwavewater.com/blogs/news/lets-talk-coffee

Sign up on the waitlist for the Tethys II cafe water system:

https://thirdwavewater.com/pages/tethys-form

For any other information please visit/email:

www.thirdwavewater.com

support@thirdwavewater.com

Credits

Alex Pond is the Director of Education at Cup of Excellence. CoE classes can be found here:

https://cupofexcellence.org/sensory-educational-training/

Ana Mallozzi is Q Grader from Covoya Coffee.

https://www.covoyacoffee.com

Brita Gustafson runs the Training & Education at New Harvest Coffee.

https://newharvestcoffee.com

Benjamin Carlson is the founder of Long Miles Coffee managing thousands of farms throughout Burundi, Africa. Coffee. People. Potential. • Long Miles Coffee

ben@longmilescoffee.com • Instagram: @longmilesben • longmilescoffee.com

Carlos Rene Guerra is the Honduras National Barista Champion in 2019, 2020 and competed in the 2022 World Barista Competition. He is also operator of Café San Rafael.

Instagram @carlosreneguerra • www.cafesanrafael.com

Juan Angel Welchez is well known for his social media presence worldwide with his channel The Cupping Farmer and locally in Copan, Honduras with his coffee farm.

Instagram: @thecuppingfarmer • www.thecuppingfarmer.com

Third Wave Water was created by two coffee guys just trying to provide an easy-to-use mineral solution for coffee and was quickly shared on ABC's TV show Shark Tank in 2017. Charles Nick and Taylor Minor are seen regularly sharing their love for coffee in coffee events all around the world. Charles Nick's background was in aerospace with NASA and Kansas State University (KSU) as a Reliability Engineer (Reliability Centered Maintenance) and professional researcher while Taylor Minor's background was over a decade in the specialty coffee industry as a roaster for his cafe Telemetry Coffee, a United States Marine Corp Veteran and inventor.

All socials: @thirdwavewater • www.thirdwavewater.com

Postscript

Thank you for taking the time to read this white paper. The research performed with our coffee partners had a singular purpose and that is to make coffee better for everyone, everywhere. A huge special thanks to Andrea Costa, Ana Mallozzi, Brita Gustafson, Christopher Hendon, Juan Angel Welchez, Alex Pond, Benjamin Carlson, Raul Morena, and Carlos Rene Guerra for your help in this research. It would not have been possible without all of you. Please make sure to support all of their efforts listed in the credits above or the works cited below, as they continue to create amazing coffee for us all.

Third Wave Water Products

Third Wave Water creates minerals products and water tools used by coffee professionals throughout the world.

Figure 8: Left to Right: Retail Stand, pH Meter, TDS Meter, Water Pump, and Mixing Stick

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Third Wave Water

Appendix A:
Juan's Tastify Reports